EOG Resources, Inc.
600 17th St, Suite 1000N
Denver, CO 80202
Main: (303) 572-9000

August 20, 2019

Claudia Smith
Tribal NSR and PSD Permits Lead
U.S. EPA, Region 8
1595 Wynkoop Street, 8P-AR
Denver, Colorado 80202-1129

Re: EOG Resources, Inc. Fertile 7 SESE 2 Pad (TAT-000874)
Fort Berthold Indian Reservation, Mountrail County, North Dakota
Registration for Oil and Natural Gas Sources
Part 2 – Emission and Production Information, Update

EOG Resources, Inc. (EOG) is submitting an updated Part 2 registration application for the Fertile 7 SESE 2 Pad located on the Ft. Berthold Indian Reservation. This registration application was prepared to meet the requirements of the U.S. EPA Federal Implementation Plan for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector, 40 CFR Part 49 issued June 3, 2016.

The most recent Part 2 Registration for the facility was received by EPA Region 8 on October 2, 2018. Since the submittal of the original registration, EOG has elected to install two gas lift compressors at the facility. The compressors are both driven by Caterpillar G3508B LE natural gas SI RICE engines. Both engines are subject to 40 CFR Subpart JJJJ requirements. The updated Part 2 Registration includes updated forms, emission calculations and narrative description of the process.

Please contact me by phone at (303) 262-9915 or email at mathew_oliver@eogresources.com with any questions you may have concerning this application.

Sincerely,

Mathew Oliver
Environmental Manager
EOG Resources, Inc. - Denver Division

Cc: R8airpermitting@epa.gov
Edmund Baker, MHA Nation (edmundbaker@mhanation.com)

Part Two: Oil & Gas Production Facility Part 2 Registration Update

Fertile 7 SESE 2 PAD
Fertile 84-0701H, 85-0701H, 86-0701H wells

Mountrail County, North Dakota

EOG Resources, Inc

August 20, 2019

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1. Introduction

EOG Resources, Inc (EOG) is hereby submitting an air registration for a new oil and gas production facility known as the Fertile 84-0701H, 85-0701H, 86-0701H (Fertile 7 SESE 2 PAD). The application is being submitted to register equipment associated with the construction of production equipment associated with a new oil gas production facility. The Facility will be located on the Fort Berthold Indian Reservation in Mountrail County, North Dakota, and will extract oil and gas using horizontal drilling and hydraulic fracturing techniques. The latitude and longitude of the Facility locations are 47.90690 N and -102.24010 W, (NAD 83) respectively.

The Facility consists of well head(s), a heater-treater separator(s), emission control device, crude oil and produced water storage tanks, two natural gas RICE driven gas lift compressors and truck loading station(s).

In accordance with the requirements of §49.160(c)(1)(iv) this application includes the Part 2 Registration Form, presented in Appendix A, and is being submitted within 60 days of Facility start up.

2. Process Description

Gas and liquids rise to the surface through the well head. The gas/liquid mixture enters a heater treater to separate the natural gas, crude oil, and produced water.

The crude oil and produced water will be temporarily stored in above ground storage tanks. Crude oil may be sent off-site via pipeline or hauled away by trucks. Produced water may be hauled away by truck for recycling and/or disposal. A control device may be used in the absence of a pipeline.

The Facility will produce approximately 832,467 standard cubic feet per day of natural gas, 2341 barrels per day (bbl/day) of crude oil and 2820 bbl/day of produced water, and will be operational 8,760 hours/year.

A Plot Plan and Facility Flow Diagram are provided in Figures 1 and 2 respectively.

3. Equipment Description

The Facility may consist of the equipment described below:

3.1 Separator/Heater Treater

The Facility may contain heater treater(s)/separator(s) for separation of multi-phase streams into individual components of crude oil, natural gas and produced water.

3.2 Tanks

The Facility may contain stable oil storage tanks and produced water storage tanks.

3.3 Control Device

The Facility may use a control device to control emissions from tanks. The Facility may use a control device to control emissions from treater gas and flashing if a pipeline is not installed. The control device will have a control efficiency of 98 percent.

3.4 Gas Lift Compressors

The facility uses two natural gas RICE driven reciprocating gas lift compressors to provided artificial lift for the three production wells.

3.5 Component Count

Component count of 1080 connectors, 311 valves, 5 pumps, 617 flanges and 13 open ended lines were used for estimating fugitive emissions.

4. Emissions Calculations

Emission calculations were performed for all emission sources in the Facility. The calculated emissions are provided in Tables 3 through 11. The Facility information used for calculating emissions is presented in Table 1. The fuel usage from the Facility is presented in Table 2. The Emission Summary of all sources is provided in Table 3 and HAP Emissions Summary is provided in Table 4. The emission sources are described below.

4.1 Tank Emissions

The tank emissions include flashing, working and breathing (F/W/B) losses. F/W/B losses for tanks were estimated using ProMax. The F/W/B losses for oil tanks are provided in Table 5 and the F/W/B losses for water tanks are provided in Table 6.

4.2 Engineered Flare Emissions

A smokeless flare is used to control tank losses. The flare will be operated a maximum of 8,760 hr/yr.

Emissions were estimated using a mass balance approach. The flare destruction efficiency will destroy 98% of all species. Inlet flare gas consists of pilot gas, tank losses and captured truck loading losses. Flare emissions are provided in Table 7.

4.3 Heater Treater Burner Emissions

The heater treater burner emissions were calculated based on the maximum heat input rating, AP-42 emission factors for natural gas combustion, and the produced natural gas heat content. The emissions calculations are provided in Table 8.

4.4 RICE Engines

Gas lift compressors are driven by two Caterpillar G3508B LE natural gas RICE engines rated at 690 bhp each. Both engines are spark ignited (SI) Lean Burn Natural Gas engines manufactured after July 1, 2010 and are subject to the following NSPS Subject JJJJ emission standards:

Pollutant	NOX	CO	VOC
Emission standard (g/hp-hr)	1.0	2.0	0.7

Both engines are equipped with Oxidation Catalyst to reduce CO, VOC and HAP emissions. Potential emissions are calculated assuming NSPS JJJJ emission standards and maximum rated bhp output.

4.5 Truck Loading Emissions

Crude oil is sent off-site either via pipeline or tanker trucks. As a worst-case scenario, this application assumes that crude oil and produced water is hauled away by trucks. Emissions from the truck loading were calculated using the AP-42 equation for truck loading losses. The truck loading emission calculations are provided in Table 9.

4.6 Fugitive Emissions

Fugitive emissions from component leaks were calculated using the Average Emission Factor Approach provided in the EPA's Protocol for Equipment Leaks Emissions Estimate (EPA 453/R-95-017 dated November 1995). This approach for estimating emissions allows use of average emission factors developed by the EPA in combination with unit-specific data that are relatively simple to obtain. The calculated fugitive emissions are based on the following:

- Number of each type of component in a unit (valve, connector, etc.)
- Service of each component (gas, light or heavy liquid)
- VOC/HAP concentration of the stream
- Gas analysis
- Liquid analysis
- EPA Average emission factors for oil and gas production operation

Fugitive emissions calculations are provided in Table 10.

The average emission factors are not intended to provide an accurate estimate of the emission rate from a single piece of equipment. According to EPA, the average factors are more appropriately applied to the estimation of emissions from populations of equipment. Since fugitive emissions from component leaks are estimated from component population, average emission factor accounts for the span of possible leak rates and considered reasonable for this analysis. Hence, screening range approaches were not used for this project.

All pneumatic controllers at this facility are operated by compressed air.

5. Air Quality Impact Analysis

EPA Region 8 requires that activities that meet certain criteria perform Air Quality Impact Analysis (AQIA). A qualitative evaluation of the applicability criteria for the Facility is provided below.

5.1 Potential to Cause Adverse Air Quality Effects/Violation of Applicable Standards

EOG performed a review of Facility emissions and the State's air quality to evaluate whether the Facility emissions exceed the applicable air quality standards.

A review of the North Dakota 2015 Annual Air Quality Report indicated that the highest criteria pollutant concentrations at state-wide monitoring stations were significantly lower than the National Ambient Air Quality Standards (NAAQS) for a majority of criteria pollutants. The table below summarizes the monitoring concentrations and their comparison with NAAQS.

Pollutant	Averaging Time (Hours)	Highest Concentration	NAAQS	Unit	Highest Concentration Location
SO2[1]	1	26	75	ppb	Lostwood
	24	6.5	140	ppb	Lostwood
	Annual	1.07	30	ppb	Beulah
NO2	1	34	100	ppb	Fargo NW
	Annual	5.37	53	ppb	Bismarck
PM2.5	24	25	35	ug/m3	Williston
	Annual	6.9	12	ug/m3	Williston
PM10	24	147	150	ug/m3	Williston
CO	1	875	35,000	ppb	Fargo NW
	8	800	9,000	ppb	Fargo NW
Ozone	8	61	70	ppb	Bismarck

[1]Monitored data for 24 hour and annual SO2 concentration was not available. Reported data is from the 2014 Air Quality Report.

Based on the table, the majority of the pollutants are less than 50 percent of the NAAQS level. This provides a wide margin before compliance could potentially be compromised. Hence, compliance with the NAAQS is expected.

The Facility is located far from the locations with highest state-wide ambient concentrations. Therefore, there is wider margin to the NAAQS limits at the Facility location.

The Facility is located in an attainment area. Based on emission rates of criteria pollutants, it is reasonable to believe that the Facility emissions does not cause or contribute to the exceedance of NAAQS.

5.2 Major Source

The Facility will not be a major source of criteria pollutants and not subject to PSD permitting requirements. Hence, this criterion is not applicable.

5.3 Stack Orientation and Heights

The stacks at the Facility will be exhausted unobstructed vertically to the atmosphere. Hence, these stacks provide adequate dispersion for the Facility emissions. The stack height for Facility emissions sources is provided below:

Source	Stack Height (ft)
Engineered Flare	10-40
Heater Treater Burner	0-15
RICE Engines	18' 8"

5.4 Terrain

The Facility is located in relatively flat to gently rolling open terrain. Due to flat terrain conditions, the dispersion of the plume is not negatively impacted.

5.5 Site Location Area Designation

The Facility is located in Mountrail County, which is designated as attainment for all criteria pollutants.

5.6 Building Downwash

There are no large buildings at the Facility. Therefore, building downwash is not a concern.

5.7 Proximity to Property Line

The majority of the emission sources will be located far from property line. This will provide adequate dispersion for the emissions before the plume reaches the property boundary.

5.8 Sensitive Receptors

The Facility is expected to be located far from any sensitive receptors to provide adequate dispersion. Hence, the ambient impact from the Facility emissions is expected to be negligible.

5.9 Vehicular Emissions

After the Facility is constructed, the primary vehicular traffic will consist of trucks hauling crude oil and produced water off-site. Based on crude oil and water production rates, respectively, an average of three trucks will enter and exit the Facility every day.

Based on low traffic volume, PM_{10} and $PM_{2.5}$ fugitive emissions are not expected to cause or contribute to an exceedance of NAAQS.

5.10 Fugitive Emissions

There will be limited process fugitive emissions. The process fugitive emissions occur due to leaks in piping components. The fugitive emissions are readily dispersed upon entering the atmosphere resulting in minimal impact on the air quality. Facility personnel use Audio-Visual-Olfactory (AVO) techniques to identify larger fugitive emissions leaks. Any fugitive emissions leaks identified will be promptly repaired to minimize emissions.

EOG utilizes the EPA protocol for Equipment Leak Emission Estimates, EPA- 453/R-95-017, November 1995 to estimate fugitive emission estimates on a monthly basis.

5.11 Summary

Based on the above AQIA, the low emissions and adequate dispersion characteristics at this Facility does not cause adverse impact on the air quality. Hence, air dispersion modeling is not required.

6. Testing, Monitoring, and Recordkeeping

6.1 Testing/Monitoring

At a minimum, the Facility will perform the following monitoring:

- Monitor oil production

- Monitor the volume of gas sent to the engineered flare.

6.2 Leak Detection Monitoring

The Facility will monitor oil/gas/water components for leaks using infrared detection techniques semi-annually in compliance with NSPS Subpart OOOOa. If EOG personnel discover a leaking component, repairs will be coordinated and implemented as soon as possible.

6.3 Recordkeeping

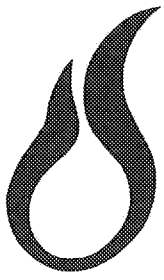
The Facility will maintain records of:

- The volume of oil produced
- The volume of natural gas produced.

7. Summary

The Facility will operate as a minor source of both criteria and hazardous air pollutants. Facility-wide emissions will not exceed 100 tpy of any criteria pollutant, and will not exceed a total of 25 tpy for all HAPs or 10 tpy of any individual HAP as demonstrated in Table 3 and Table 4.

Figures



EOG Resources, Inc.

Revised: 3/23/2017

Pad Name: Fertile 7 SESE 2

Fertile 85-0701H,
Fertile 84-0701H &
Fertile 86-0701H

SE1/4SE1/4, Section 7
Township 151 North
Range 90 West
5th Principal Meridian
Mountrail County
North Dakota

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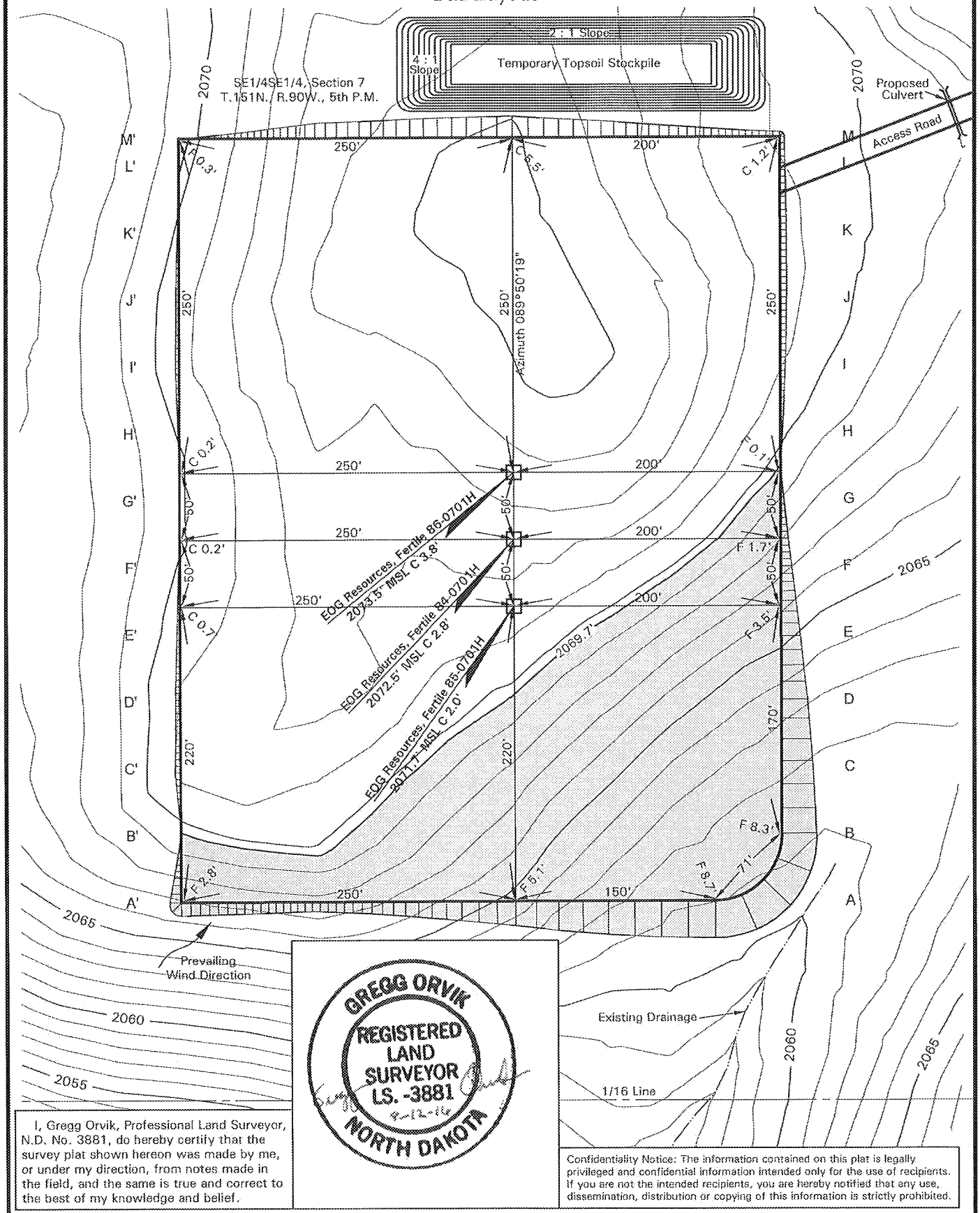
Fertile 7 SESE 2
Pad Layout



GREGG ORVIK
REGISTERED LAND SURVEYOR
LS. -3881
NORTH DAKOTA

I, Gregg Orvik, Professional Land Surveyor, N.D. No. 3881, do hereby certify that the survey plat shown hereon was made by me, or under my direction, from notes made in the field, and the same is true and correct to the best of my knowledge and belief.

Computed & Drawn By	Surveyed By	Approved By	Scale	Date
C. Woodbury	B. Sherlock	G. Orvik	1" = 100'	10/1/2015
Field Book	**Material**	**Revised**	**Project No.**	**Drawing No.**
Minot OW#61	Pad Layout	8/11/2016	7715181	-

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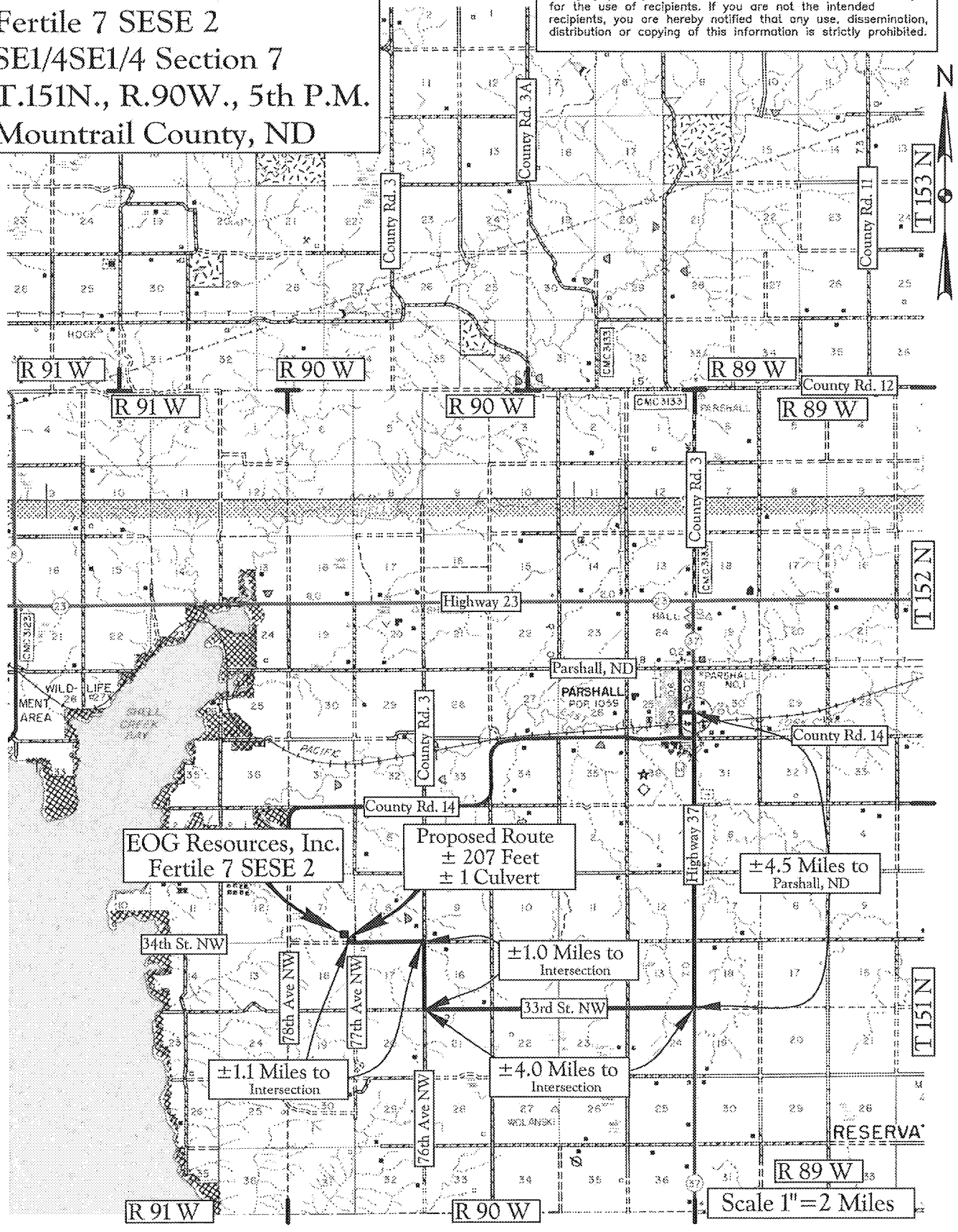
EOG Resources, Inc.
Fertile 7 SESE 2
SE1/4SE1/4 Section 7
T.151N., R.90W., 5th P.M.
Mountrail County, ND



Map "A"
County Access Route

Legend
Existing Roads
Proposed Roads

Revised: 8/11/2016

KLJ

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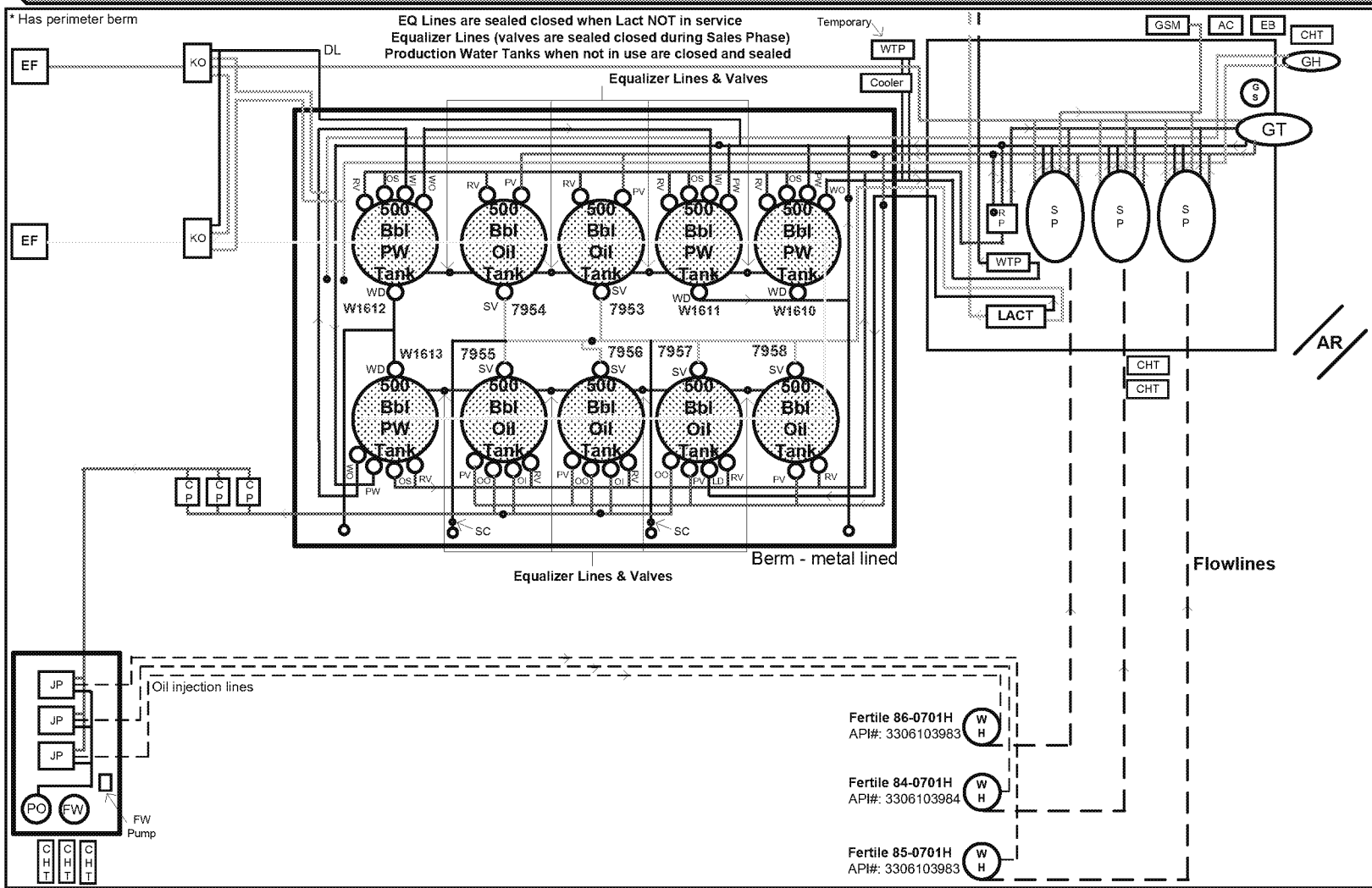
eog resources
Site Facility Diagram

Well Name: Fertile 84, 85, & 86-0701H
1/4 1/4: SESE **Sec:** 7 **T:** 151N **R:** 90W
County: Mountrail **State:** North Dakota
Lat.: 47.906848 **Long.:** -102.23982
Lease: NDM98942 **CA #:** Pending
Type of well:
Injection: **Oil:** X **Gas:** **Tank Battery:** X

EOG Resources, Inc. site facility diagrams & site security plans are located at the Stanley office in Stanley, North Dakota. The office is located at 6201 81st Ave NW and normal business hours are 7:00am to 4:30pm CST.

Valve	Production Phase	Sales Phase	Recycle Phase
PV	O/C	SC	O/C
SV	SC	O	SC
RV	O/C	SC	O/C
EV	O	SC	O

Revised: 8/6/18



Abbreviations

AC = Air Compressor
AR = Access Road
CHT = Chemical Tank
CP = Charge Pump
DL = Drain Line
EB = Electrical Building
EF = Engineered Flare
EV = Equalizer Valve
FW = Fresh Water
GH = Glycol Heater
GS = Gas Scrubber
GSM = Gas Sales Meter
GT = Group Treater
JP = Jet Pump
KO = Knockout
LACT = LACT Unit
LD = LACT Divert
O = Open
O/C = Open/Closed
OI = Oil Inlet
OO = Oil Outlet
OS = Oil Skim
PO = Pop-Off Tank
PV = Production Valve
PW = Produced Water
RP = Recycle Pump
RV = Recycle Valve
SC = Sealed Closed
SP = Separator
SV = Sales Valve
WD = Water Drain
WH = Wellhead
WI = Water Inlet
WO = Water Outlet
WTP = Water Transfer Pump

• = Valve
---------- = Buried Line
_____ = Unburied Line

Equalizer Lines
Tank Vent Line
Water Line
Oil Production Line
Recycle Line
Sales Line
Gas Line
Glycol Line

Tables

TABLE 1
FACILITY INFORMATION SUMMARY

FACILITY INFORMATION		
Facility ID	Fertile 7 SESE 2 PAD	Name of the facility

PRODUCTION DATA		DESCRIPTION
Daily Average Oil Production Rate	2340.8	Average daily production in barrels of oil per day (BOPD), based on the first 30 days of production.
Produced Water Tank Throughput	2819.8	Average daily production in barrels of water per day (BWPD), based on the first 30 days of production.
Daily Average Gas Production Rate	832.5	Average daily production of gas in Mscf per day, based on the first 30 days of production.
Decline Factor	1	Decline factor built into oil and gas production expectations, default is set to 0.6.
Adjusted Daily Average Oil Production Rate	2340.8	This is the average BOPD expected to be produced for the first 365 days of operation.
Adjusted Daily Average Gas Production Rate	832.5	This is the average daily mcfd of gas the well is expected to produce in the first 365 days of operation.

OIL/CONDENSATE TANKS		DESCRIPTION
Molecular Weight	44.17	Molecular weight of the tank vapors in pounds per pound-mole (lb/lb-mole). Obtained from promax.
VOC%	0.80	VOC weight fraction of the tank vapor gas (C3+). Obtained from Promax.
HAP%	0.04	HAP weight fraction of the tank vapor gas. Obtained from Promax.
H_2S weight %	0.00	H_2S weight percent of the tank vapor gas. Obtained from Promax.
Flare Efficiency	98.00%	Flare destruction efficiency to control tank vapor emissions

TREATER GAS DATA		DESCRIPTION
Heating Value	1,427.7	Btu/scf of wellstream gas.
Molecular Weight	27.32	Average molecular weight of the wellstream gas in lb/lb-mole.
Specific Gravity	0.94	If necessary to convert specific gravity to molecular weight, enter the specific gravity of the wellstream gas.
Calculated Molecular Weight	27.21	Calculated molecular weight based on the specific gravity entered above.
VOC%	39.17%	VOC weight fraction of the wellstream gas (C3+).
HAP%	1.65%	HAP weight fraction of the wellstream gas.
H_2S weight %	0.000%	H_2S weight percent of the wellstream gas
H_2S mole %	0.0000%	H_2S mole percent of the wellstream gas
Control Equipment (No Gas Pipeline)	Engineered Flare	Used to combusted gas stream when pipeline is unavailable
Control Destruction Efficiency	98%	Control efficiency of any applicable controls (combustor, pit flare, utility flare, etc).

HEATER TREATER		DESCRIPTION
Firing Rate	1,750,000	Combined burner rating for the burners in Btu/hr.
Hours of Operation	8,760	The burner is assumed to operate 8,760 hours per year.

TRUCK LOADING		DESCRIPTION
Oil is hauled by truck		If sales oil pipeline is unavailable, oil will be hauled by truck
Submerged loading: dedicated normal service	0.6	Submerged loading: dedicated normal service
Molecular Weight	44.2	Molecular weight of tank vapors in lb/lb-mole (obtained from Promax)
Vapor Pressure	3.10	True vapor pressure of liquid loaded, pounds per square inch absolute (psia).
Temperature	50	Estimated average annual temperature of liquid loaded in °F
Load Rate (bbl/hr)	200	Maximum load rate of liquid loaded in barrels per hour.
Load Time (hrs)	1	The time it takes to loadout one load (hrs).

MISCELLANEOUS		DESCRIPTION
Pilot Fuel consumption	2.16	Fuel consumption in scf/min

RICE		DESCRIPTION
Hours of Operation	8760	Engine is assumed to operate 8,760 hours per year.
Maximum HP Rating	690	Manufacturer's maximum hp rating.
NOx g/hp-hr	1	Manufacturer's emission factor in grams per horsepower hour (g/hp-hr) for nitrogen oxides (NOx).
CO g/hp-hr	2	Manufacturer's emission factor in g/hp-hr for carbon monoxide (CO).
VOC g/hp-hr	0.7	Manufacturer's emission factor in g/hp-hr for total organic compounds (TOC or THC).
NOx Control Efficiency	0.00%	NOx control efficiency (NSCR catalyst, AFRC, etc) from manufacturer data or actual test results.
CO Control Efficiency	0.00%	CO control efficiency (NSCR catalyst, AFRC, etc) from manufacturer data or actual test results.
VOC Control Efficiency	0.00%	VOC control efficiency (NSCR catalyst, AFRC, etc) from manufacturer data or actual test results.

TABLE 2
FACILITY-WIDE FUEL USE

Type of Fuel	Equipment	Quantity of Fuels			Sulfur Content *% mole*
		Maximum hourly *scf/hr*	Daily *scf/day*	Annual *MMscf/yr*	
Natural Gas	RICE1-2	2,460.40	59,049.62	21.55	0.00
	Heater Treater	1,225.75	29,417.94	10.74	0.00
	Pilot	129.60	3,110	1.14	0.00
	Flare	34,687.50	832,500	303.86	0.00

TABLE 3

EMISSIONS SUMMARY

UNCONTROLLED EMISSIONS

SOURCE	VOC	HAP	NOx	CO	H_2S	SO_2	CO_2e[a]
	(TPY)						(MT/yr)
Oil Tanks	2,092	105.83	--	--	0.00	--	
Water Tanks	6.67	0.12	--	--	--	--	
Engineered Flare	1,821	76.71	6.26	34.07	0.00	0.00	
Treater Burner	0.04	0.01	0.75	0.63	0.00	0.00	
RICE Engine	9.33	2.67	13.33	33.25	--	--	
Truck Loading	0.33	0.01	--	--	--	--	
Produced Water Tank	0.00	0.00		--	--	--	
Emergency Tank Vent	0.00	0.00		--	--	--	
Fugitive	7.24	0.18	--	--	--	--	
Totals (No Gas Pipeline)[b]	**3,936.57**	**185.52**	**20.34**	**67.95**	**0.00**	**0.00**	**3,670.07**
Totals (With Gas Pipeline)[c]	**2,115.75**	**106.15**	**14.08**	**33.88**	**0.00**	**0.00**	**0.01**

CONTROLLED EMISSIONS

SOURCE	VOC	HAP	NOx	CO	H_2S	SO_2	CO_2e
	(TPY)						(MT/yr)
Oil Tank Flash Gas	41.31	2.10	--	--	0.00	--	
Oil Tank Working and Breathing	0.53	0.02	--	--	0.00	--	
Water Tanks	0.13	0.00	--	--	0.00	--	
Engineered Flare	36.42	1.53	6.26	34.07	0.00	0.00	
Treater Burner	0.04	0.01	0.75	0.63	0.00	0.00	
RICE Engine	9.33	2.67	13.33	26.65	--	--	
Truck Loading[d]	0.00	0.00	--	--	--	--	
Fugitive	7.24	0.18	--	--	--	--	
Totals (No Gas Pipeline)[b]	**95.00**	**6.51**	**20.34**	**61.35**	**0.00**	**0.00**	**31,419.28**
Totals (With Gas Pipeline)[c]	**58.45**	**4.98**	**14.08**	**27.28**	**0.00**	**0.00**	**2,534.35**

Notes:

[a]Uncombusted GHG

[b]No Gas Pipeline - gas produced from treater will be sent to engineered flare

[c]With Gas Pipeline - gas produced from treater will be sent to the gas pipeline

[d]These emissions assume the sales oil pipeline is in place.

TABLE 4

HAZARDOUS AIR POLLUTANT (HAP) EMISSIONS SUMMARY

UNCONTROLLED HAP EMISSION SUMMARY

SOURCE	POTENTIAL TO EMIT (TPY)					
	BENZENE	TOLUENE	ETHYLBENZENE	XYLENE	2,2,4 TMP	N-HEXANE
Oil Tanks	1.14	1.41	0.57	1.37	31.09	70.25
Water Tanks	0.02	0.02	0.01	0.02	0.01	0.04
Engineered Flare	1.50	1.48	0.62	1.44	31.09	70.96
Heater Treater	0.00	0.00	0.00	0.00	0.00	0.01
RICE Engine	0.00	0.00	0.00	0.00	0.00	0.00
Truck Loading	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2.66**	**2.91**	**1.21**	**2.84**	**62.29**	**141.33**

CONTROLLED HAP EMISSION SUMMARY

SOURCE	POTENTIAL TO EMIT (TPY)					
	BENZENE	TOLUENE	ETHYLBENZENE	XYLENE	2,2,4 TMP	N-HEXANE
Oil Tanks	0.02	0.03	0.01	0.03	0.62	1.41
Water Tanks	0.00	0.00	0.00	0.00	0.00	0.00
Engineered Flare	0.03	0.03	0.01	0.03	0.62	1.42
Heater Treater	0.00	0.00	0.00	0.00	0.00	0.01
RICE Engine	0.00	0.00	0.00	0.00	0.00	0.00
Truck Loading	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.06**	**0.06**	**0.03**	**0.07**	**1.34**	**2.90**

Notes:

[a]No Gas Pipeline - gas produced from treater will be sent to engineered flare

[b]With Gas Pipeline - gas produced from treater will be sent to the gas pipeline

TABLE 5
WORKING, BREATHING & FLASHING EMISSIONS-OIL TANKS

Flashing Emissions

Flare Control Efficiency % 98

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
Water	14.241	0.284	0.285	0.006
Hydrogen Sulfide	0.000	0.000	0.000	0.000
Oxygen	0.000	0.000	0.000	0.000
Carbon Dioxide	3.106	0.087	0.062	0.002
Nitrogen	45.178	0.802	0.904	0.016
Methane	137.019	1.822	2.740	0.036
Ethane	319.789	1.230	6.396	0.025
Propane	752.524	0.906	15.050	0.018
iso-Butane	152.666	0.079	3.053	0.002
n-Butane	583.670	0.395	11.673	0.008
iso-Pentane	137.974	0.053	2.759	0.001
n-Pentane	175.633	0.034	3.513	0.001
Heptanes	145.422	0.029	2.908	0.001
Octanes	9.256	0.000	0.185	0.000
Nonanes	3.639	0.000	0.073	0.000
Decanes+	0.034	0.008	0.001	0.000
Benzene	1.130	0.258	0.023	0.005
Toluene	1.402	0.320	0.028	0.006
Ethylbenzene	0.566	0.129	0.011	0.003
Xylenes	1.358	0.310	0.027	0.006
n-Hexane	69.604	15.891	1.392	0.318
2,2,4-Trimethylpentane	30.834	7.040	0.617	0.141
Total	2585.046	29.678	51.701	0.594

Flashing Emissions Summary

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/yr	TPY	lb/yr
VOC	2065.713	25.453	41.314	0.509
H2S	0.000	0.000	0.000	0.000
HAPs	104.895	23.949	2.098	0.479

Working & Breathing Emissions

Flare Control Efficiency % 98

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
Water	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	0.000	0.000	0.000
Oxygen	0.000	0.000	0.000	0.000
Carbon Dioxide	0.047	0.011	0.001	0.000
Nitrogen	0.074	0.017	0.001	0.000
Methane	0.790	0.180	0.016	0.004
Ethane	6.562	1.498	0.131	0.030
Propane	11.350	2.591	0.227	0.052
iso-Butane	2.031	0.464	0.041	0.009
n-Butane	7.353	1.679	0.147	0.034
iso-Pentane	1.569	0.358	0.031	0.007
n-Pentane	1.898	0.433	0.038	0.009
Heptanes	1.214	0.277	0.024	0.006
Octanes	0.062	0.014	0.001	0.000
Nonanes	0.021	0.005	0.000	0.000
Decanes+	0.000	0.000	0.000	0.000
Benzene	0.006	0.001	0.000	0.000
Toluene	0.008	0.002	0.000	0.000
Ethylbenzene	0.003	0.001	0.000	0.000
Xylenes	0.009	0.002	0.000	0.000
n-Hexane	0.650	0.148	0.013	0.003
2,2,4-Trimethylpentane	0.258	0.059	0.005	0.001
Total	33.906	7.741	0.678	0.155

Working & Breathing Emissions Summary

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
VOC	26.433	6.035	0.529	0.121
H2S	0.000	0.000	0.000	0.000
HAPs	0.934	0.213	0.019	0.004

Notes:
Oil is flashed in the tanks and is captured a VRU with flare backup
Working, Breathing & Flashing emissions obtained from Promax

TABLE 6
WORKING, BREATHING & FLASHING EMISSIONS-WATER TANKS

Flashing Emissions

Flare Control Efficiency % 98

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
Water	1.246	0.284	0.025	0.006
Hydrogen Sulfide	0.000	0.000	0.000	0.000
Oxygen	0.000	0.000	0.000	0.000
Carbon Dioxide	0.380	0.087	0.008	0.002
Nitrogen	3.511	0.802	0.070	0.016
Methane	7.981	1.822	0.160	0.036
Ethane	5.387	1.230	0.108	0.025
Propane	3.968	0.906	0.079	0.018
iso-Butane	0.344	0.079	0.007	0.002
n-Butane	1.730	0.395	0.035	0.008
iso-Pentane	0.232	0.053	0.005	0.001
n-Pentane	0.148	0.034	0.003	0.001
Heptanes	0.129	0.029	0.003	0.001
Octanes	0.002	0.000	0.000	0.000
Nonanes	0.000	0.000	0.000	0.000
Decanes+	0.000	0.000	0.000	0.000
Benzene	0.018	0.004	0.000	0.000
Toluene	0.022	0.005	0.000	0.000
Ethylbenzene	0.009	0.002	0.000	0.000
Xylenes	0.020	0.005	0.000	0.000
n-Hexane	0.036	0.008	0.001	0.000
2,2,4-Trimethylpentane	0.012	0.003	0.000	0.000
Total	25.176	5.748	0.504	0.115

Flashing Emissions Summary

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/yr	TPY	lb/yr
VOC	6.671	1.523	0.133	0.030
H2S	0.000	0.000	0.000	0.000
HAPs	0.117	0.027	0.002	0.001

Working & Breathing Emissions

Flare Control Efficiency % 98

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
Water	0.539	0.123	0.011	0.002
Hydrogen Sulfide	0.000	0.000	0.000	0.000
Oxygen	0.000	0.000	0.000	0.000
Carbon Dioxide	0.013	0.003	0.000	0.000
Nitrogen	0.002	0.001	0.000	0.000
Methane	0.014	0.003	0.000	0.000
Ethane	0.009	0.002	0.000	0.000
Propane	0.001	0.000	0.000	0.000
iso-Butane	0.000	0.000	0.000	0.000
n-Butane	0.000	0.000	0.000	0.000
iso-Pentane	0.000	0.000	0.000	0.000
n-Pentane	0.000	0.000	0.000	0.000
Heptanes	0.000	0.000	0.000	0.000
Octanes	0.000	0.000	0.000	0.000
Nonanes	0.000	0.000	0.000	0.000
Decanes+	0.000	0.000	0.000	0.000
Benzene	0.000	0.000	0.000	0.000
Toluene	0.000	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000	0.000
2,2,4-Trimethylpentane	0.000	0.000	0.000	0.000
Total	0.579	0.132	0.012	0.003

Working & Breathing Emissions Summary

Component	Uncontrolled Emissions		Controlled Emissions	
	TPY	lb/hr	TPY	lb/hr
VOC	0.001	0.000	0.000	0.000
H2S	0.000	0.000	0.000	0.000
HAPs	0.000	0.000	0.000	0.000

Notes:
Water is flashed in the tanks and is captured by the flare.
Working, Breathing & Flashing emissions obtained fromPromax

TABLE 7
ENGINEERED FLARE EMISSIONS

Volume of Gas sent to Flare	353,386	scf/day
Lower Heating Value	1,428	Btu/scf
Average Molecular Weight	27.32	lb/lb-mole
Standard Molar Volume		
VOC Weight %	39.17%	
HAP Weight %	1.65%	
H_2S Weight %	0.00%	
H_2S Mole %	0.00%	
Flare Destruction Efficiency	98.00%	

EMISSION RATE CALCULATION

							No Gas Pipeline[2]				With Gas Pipeline[3]	
							Flare Inlet (Uncontrolled) Emissions		Flare Outlet (Controlled) Emissions		Flare Outlet (Controlled) Emissions	
Pollutant	Volume of Gas		Std Mol Vol	MW	Wt%	Usage	Hourly	Annual	Hourly	Annual	Hourly	Annual
	scf/day	*scf/hr*	*scf/lb-mol*	*lb/lb-mole*	*wt%*	*hrs/yr*	*lbs/hr*	*tpy*	*lbs/hr*	*tpy*	*lbs/hr*	*tpy*
VOC	353,386	14724.40	379	27.32	39.17%	8760	415.71	1820.82	8.31	36.42	0.00	0.00
HAP	353,386	14,724	379	27.32	1.65%	8760	17.51	76.71	0.35	1.53	0.00	0.00
H_2S	353,386	14,724	379	27.32	0.00%	8760	0.00	0.00	0.00	0.00	0.00	0.00
	Volume of Gas		Std Mol Vol	MW	E.F.[1]	Usage	Hourly	Annual	Hourly	Annual	Hourly	Annual
	scf/day	*scf/hr*	*scf/lb-mol*	*lb/lb-mole*	*lb/ MMBtu*	*hr/yr*	*lbs/hr*	*tpy*	*lb/hr*	*tpy*	*lb/hr*	*tpy*
NO_X	353,386	14,724			0.068	8760	0.00	0.00	1.43	6.26	0.00	0.00
CO	353,386	14,724			0.37	8760	0.00	0.00	7.78	34.07	0.00	0.00
SO_2	353,386	14,724	379	64		8760	0.00	0.00	0.00	0.00	0.00	0.00

HAP SPECIATED EMISSIONS

		Emissions					
		Uncontrolled				Controlled	
HAP	Weight	Treater Gas	F/W/B (Oil Tanks)	F/W/B (Water Tanks)	Total	No Gas Pipeline[2]	With Gas Pipeline[3]
	%	*tpy*				*tpy*	*tpy*
Benzene	0.48	0.3659	1.1364	0.0179	1.5023	0.0300	0.000
Toluene	0.09	0.0667	1.4098	0.0217	1.4766	0.0295	0.000
Ethylbenzene	0.07	0.0545	0.5690	0.0086	0.6234	0.0125	0.000
Xylenes	0.09	0.0683	1.3671	0.0203	1.4354	0.0287	0.000
2,2,4-Trimethylpentane	0.00	0.0000	31.0918	0.0121	31.0918	0.6218	0.000
n-hexane	0.93	0.7103	70.2544	0.0364	70.9647	1.4193	0.000

Sample Calculations

Uncontrolled Emissions (VOC, HAP. and H_2S) = (volume of gas, scf/hr) * (weight, %) * (MW, lb/lbmol) * (conversion factor, scf/lbmol)

Controlled Emissions (VOC, HAP, and H_2S) = (emission rate, lbs/hr) * (1-destruction efficiency, %)

Emissions from NO_x and CO = (volume of gas, scf/hr) * (Lower heating value, Btu/scf) * (Emission factor, lb/MMBtu) * (Btu/MMBtu)

[1]NOx & CO emission factors are from AP-42 Table 13.5-1 ((Emission Factors for Flare Operations).)
HAP Speciation based on Extended Gas Analysis for Tank Vapo
[2]No Gas Pipeline - gas produced from treater will be sent to engineered flar
[3]With Gas Pipeline - gas produced from treater will be sent to the gas pipelin

TABLE 8
HEATER TREATER BURNER EMISSIONS

Burner Rating: 1,750,000 Btu/hr
Burner Fuel: Natural Gas

Pollutant	Burner Rating	E.F.	Conv.	Usage	Emissions	
	MMBtu/hr	*lb/MMBtu*	*lb/ton*	*hr/yr*	*lb/hr*	*tpy*
VOC	1.75	0.0054	2000	8760	0.0094	0.0413
HAP	1.75	1.77E-03	2000	8760	0.0031	0.0136
NO_X	1.75	0.0980	2000	8760	0.1716	0.7515
CO	1.75	0.0824	2000	8760	0.1441	0.6312

HAP SPECIATED EMISSIONS

HAP	Burner Rating	HAP Emission Factor	Conv.	Usage	Emissions	
	MMBtu/hr	*lb/MMBtu*	*lb/ton*	*hr/yr*	*lbs/hr*	*tpy*
Benzene	1.75	2.06E-06	2000	8760	3.60E-06	1.58E-05
Toluene	1.75	3.33E-06	2000	8760	5.83E-06	2.56E-05
Ethylbenzene	1.75	0.00	2000	8760	0.00	0.00
Xylenes	1.75	0.00	2000	8760	0.00	0.00
2,2,4-Trimethylpentane	1.75	0.00	2000	8760	0.00	0.00
n-hexane	1.75	1.76E-03	2000	8760	3.09E-03	1.35E-02

NOx, CO & VOC Emission Factors are based on AP-42 Table 1.4-1 and 1.4-2
Emission factors were calculated using AP-42 Emissions for Natural Gas Combustion (Tables 1.4-1 and 1.4-2).
Natural gas heat content 1,020 Btu/scf
Propane Heat Content 91.5×10^6 Btu/1000 gallons

Sample Calculations- Benzene from Treater Burner

Benzene Emissions 1750000 (Btu/hr) x 8760 hrs/year x 0.00000206 lbs/MMBtu x 1/ 1000000 (MMBtu/Btu) (1/2000) (tons/lb) 1.58E-05

TABLE 9
RICE EMISSIONS

Engine 1 : Caterpillar G3508B LE Gas Lift Compressor
Maximum Horsepower 690 hp

Pollutant	Maximum horsepower	Emission Factors		Conversion Factor			Emissions			
		Uncontrolled[1]	Controlled				Uncontrolled		Controlled	
		g/hp-hr	*g/hp-hr*	*g/lb*	*hrs/yr*	*lb/ton*	*lb/hr*	*tpy*	*lb/hr*	*tpy*
NO_X	690	1.00	1	453.6	8760	2000	1.52	6.66	1.52	6.66
CO	690	2.99	2	453.6	8760	2000	4.55	19.92	3.04	13.33
VOC	690	0.70	0.7	453.6	8760	2000	1.06	4.66	1.06	4.66
Formaldehyde	690	0.20	0.2	453.6	8760	2000	0.30	1.33	0.30	1.33

Engine 2: Caterpillar G3508B LE Gas Lift Compressor
Maximum Horsepower 690 hp

Pollutant	Maximum horsepower	Emission Factor	Conversion Factor			Emissions			
						Uncontrolled		Controlled	
		g/hp-hr	*g/lb*	*hrs/yr*	*lb/ton*	*lb/hr*	*tpy*	*lb/hr*	*tpy*
NO_X	690	1.00	1	453.6	8760	2000	1.52	6.66	1.52	6.66
CO	690	2.99	2	453.6	8760	2000	3.04	13.33	3.04	13.33
VOC	690	0.70	0.7	453.6	8760	2000	1.06	4.66	1.06	4.66
Formaldehyde	690	0.20	0.2	453.6	8760	2000	0.30	1.33	0.30	1.33

Aggregated Emissions

Pollutant	Uncontrolled	Controlled
	tpy	*tpy*
NO_X	13.33	13.33
CO	33.25	26.65
VOC	9.33	9.33
Formaldehyde	2.67	2.67

Notes:
[1] Uncontrolled Emission Factors from AP-42 Chapter 3: Stationary Internal Combustion Sources, Table 3.2-3

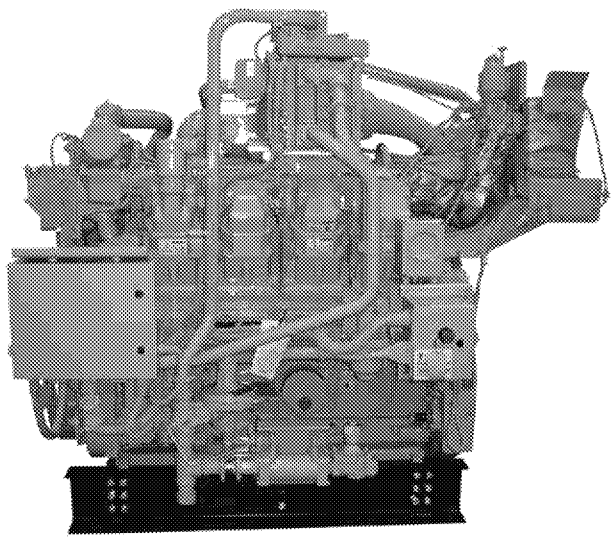
Sample Calculations
NO_X Uncontrolled Emissions (hp) x 8760 hrs/year x 1.0 g/hp-hr x (1/453.6)(lb/g) (1/2000) (tons/lb)
NO_X Controlled Emissions (hp) x 8760 hrs/year x 1.0(g/hp-hr) x (1/453.6)(lb/g) x (1/2000) x (tons/lb) x1(%)

CATERPILLAR®

G3508B LE Gas Petroleum Engine

515 bkW (690 bhp)
1400 rpm

0.5 g/bhp-hr NOx or 1.0 g/bhp-hr NOx (NTE)



CAT® ENGINE SPECIFICATIONS

V-8, 4-Stroke-Cycle

Bore	170 mm (6.7 in.)
Stroke	190 mm (7.5 in.)
Displacement	34.6 L (2115 cu. in.)
Aspiration	Turbocharged-2 Stage Aftercooled
Digital Engine Management	
Governor and Protection	Electronic (ADEM™ A3)
Combustion	Low Emissions (Lean Burn)
Engine Weight	
net dry (approx)	3941 kg (8688 lb)
Power Density	7.7 kg/kW (12.6 lb/hp)
Power per Displacement	19.9 bhp/L
Total Cooling System Capacity	130.5 L (34.4 gal)
Jacket Water	119 L (31.4 gal)
Aftercooler Circuit	11.5 L (3 gal)
Lube Oil System (refill)	220 L (58 gal)
Oil Change Interval	1000 hours
Rotation (from flywheel end)	Counterclockwise
Flywheel and Flywheel Housing	SAE No. 00
Flywheel Teeth	183

FEATURES

Engine Design
- Built on G3500 LE proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range at lower site air densities (high altitude/hot ambient temperatures)
- Higher power density improves fleet management
- Quality engine diagnostics
- Detonation-sensitive timing control for individual cylinders

Ultra Lean Burn Technology (ULB)
ULB technology uses an advanced control system, a better turbo match, improved air and fuel mixing, and a more sophisticated combustion recipe to provide:
- Lowest engine-out emissions
- Highest fuel efficiency
- Improved altitude and speed turndown
- Stable load acceptance and load rejection

Emissions
- Meets U.S. EPA Spark Ignited Stationary NSPS emissions for 2010 and some non-attainment areas
- Lean air/fuel mixture provides best available emissions and fuel efficiency for engines of this bore size

Advanced Digital Engine Management
ADEM A3 engine management system integrates speed control, air/fuel ratio control, and ignition/detonation controls into a complete engine management system. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

Full Range of Attachments
Large variety of factory-installed engine attachments reduces packaging time.

Testing
Every engine is full-load tested to ensure proper engine performance.

Gas Engine Rating Pro
GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

Product Support Offered Through Global Cat Dealer Network
More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

Over 80 Years of Engine Manufacturing Experience
Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

Web Site
For all your petroleum power requirements, visit www.catoilandgas.cat.com.

STANDARD EQUIPMENT

Air Inlet System
Axial Flow Air cleaner
Cleanable
Single element canister type with service indicator

Control System
ADEM A3 with integrated electronic throttle control
CSA certified

Cooling System
Two-stage charge air cooling
  First Stage — JW + OC + 1st Stage AC
  Second Stage — 2nd Stage AC
Thermostats and housing
Gear-driven jacket and aftercooler water pump
Stainless steel aftercooler cores

Exhaust System
Dry exhaust manifolds
Exhaust outlet: 200 mm I.D.

Flywheels and Flywheel Housings
SAE No. 00 flywheel
SAE No. 00 flywheel housing
SAE standard rotation

Fuel System
7-50 psi gas supply
Electronic fuel metering valve
Gas pressure regulator, pivot valve operated

Ignition System
ADEM A3
Outdoor CSA certified

Lubrication System
Crankcase breather — top mounted
Oil cooler
Oil filter — RH
Oil pan
Oil sampling valve
Turbo oil accumulator

Power Take-Offs
Front housing — two-sided
Front lower — LH accessory drive

Torsional Vibration Analysis
Provided through Caterpillar, required through Q1 2010

General
Paint — Cat yellow
Crankshaft vibration damper and guard

OPTIONAL EQUIPMENT

Air Inlet System
Round air inlet adaptors

Charging System
Battery chargers
CSA certified version available with
  Charging system
  CSA alternator (24V, 65A)

Cooling System
Mechanical joint assembly connections

Exhaust System
Flexible fittings
Elbows
Flanges

Fuel System
Gas filter

Instrumentation
Advisor display panel
Communications module

Lubrication System
Lubricating oil
Oil bypass filter
Air prelube pump

Power Take-Offs
Front stub shaft
Pulleys

General
Special paint

EU Certification
EEC DOI certification

Support
Factory commissioning

TECHNICAL DATA

G3508B Gas Petroleum Engine — 1400 rpm

Fuel System		0.5 g NOx NTE Rating DM8826-00	1.0 g NOx NTE Rating DM8827-00
Engine Power			
@ 100% Load	bkW (bhp)	514.53 (690)	514.53 (690)
Engine Speed	rpm	**1400**	**1400**
Max Altitude @ Rated Torque and 38°C (100°F)	m (ft)	1524 (5000)	1828.8 (6000)
Speed Turndown @ Max Altitude, Rated Torque, and 38°C (100°F)	%	36	36
Aftercooler Temperature			
Stage 1 (JW)	°C (°F)	95.0 (203)	95.0 (203)
Stage 2 (SCAC)	°C (°F)	54.44 (130)	54.44 (130)
Compression Ratio		8.0:1	8.0:1
Emissions*			
NOx	g/bkW-hr (g/bhp-hr)	0.67 (0.50)	1.34 (1.00)
CO	g/bkW-hr (g/bhp-hr)	3.46 (2.58)	4.01 (2.99)
CO_2	g/bkW-hr (g/bhp-hr)	639.67 (477)	610.17 (455)
VOC**	g/bkW-hr (g/bhp-hr)	0.74 (0.55)	0.58 (0.43)
Fuel Consumption***			
@ 100% Load	MJ/bkW-hr (Btu/bhp-hr)	10.26 (7254)	10.00 (7068)
@ 75% Load	MJ/bkW-hr (Btu/bhp-hr)	10.89 (7700)	10.68 (7549)
Heat Balance			
Heat Rejection to Jacket Water @ 100% Load			
JW	bkW (Btu/min)	190.24 (10,819)	1953.81 (111,111)
OC	bkW (Btu/min)	46.16 (2625)	46.16 (2625)
Heat Rejection to Aftercooler @ 100% Load			
1st Stage AC	bkW (Btu/min)	88.13 (5012)	74.28 (4224)
2nd Stage AC	bkW (Btu/min)	53.63 (3050)	48.62 (2765)
Heat Rejection to Exhaust @ 100% Load	bkW (Btu/min)	526.70 (29,953)	502.00 (28,548)
Heat Rejection to Atmosphere @ 100% Load	bkW (Btu/min)	61.51 (3498)	61.51 (3498)
Exhaust System			
Exhaust Gas Flow Rate @ 100% Load	m^3/min (cfm)	126.15 (4455)	120.37 (4251)
Exhaust Stack Temperature @ 100% Load	°C (°F)	499.44 (931)	512.78 (955)
Intake System			
Air Inlet Flow Rate @ 100% Load	m^3/min (scfm)	45.17 (1595)	42.28 (1493)
Gas Pressure	kPag (psig)	48-345 (7-50)	48-345 (7-50)

*at 100% load and speed, all values are listed as not to exceed

**Volatile organic compounds as defined in U.S. EPA 40 CFR 60, subpart JJJJ

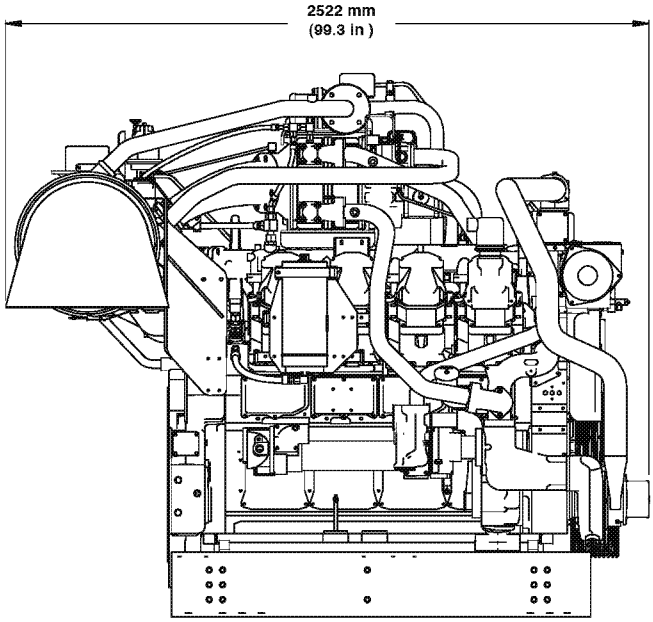
***ISO 3046/1

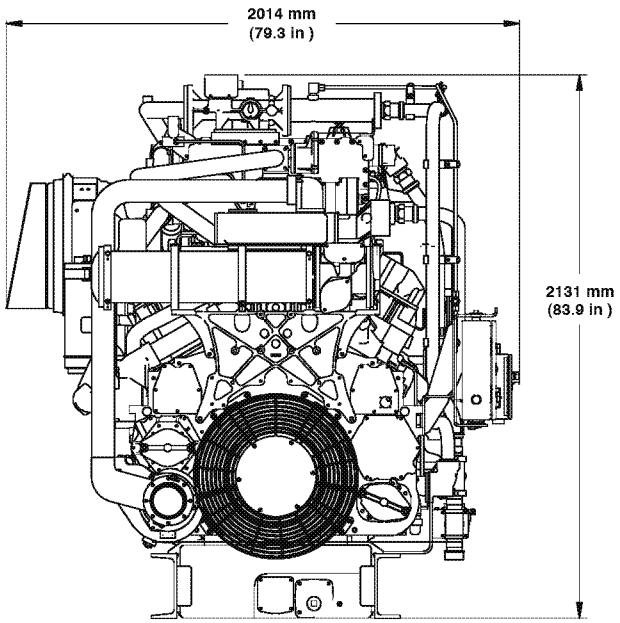
CATERPILLAR®

G3508B LE GAS PETROLEUM ENGINE

515 bkW (690 bhp)

G3508B — RIGHT SIDE VIEW & FRONT VIEW





DIMENSIONS		
Length	mm (in)	2522 (99.3)
Width	mm (in)	2014 (79.3)
Height	mm (in)	2131 (83.9)
Shipping Weight	kg (lb)	3941 (8688)

Note: General configuration not to be used for installation. See general dimension drawing number LA5250.

RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

Conditions: Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in. Hg) and 15° C (59° F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in. Hg) and 15.6° C (60.1° F). Air flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and 25° C (77° F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and stack temperature.

Performance Numbers: DM8826-00, DM8827-00
LEHW0072-01 (1-10)

TABLE 10
TRUCK LOADING EMISSIONS

Formula: $L_L = 12.46 \frac{SPM}{T}$ AP-42, Chap. 5-2, Eq. 1: Loading Loss (lb/10^3 gallon of liquid loaded)

Where:	S =	0.6	Submerged loading: dedicated normal service *Source AP-42, Table 5.2-1*
	P =	3.10	True vapor pressure of liquid loaded
	M =	50.00	Molecular weight of tank vapors (lb/lb-mol)
	T =	510.00	Temperature of bulk liquid loaded ($^{\circ}R = {}^{\circ}F+460$)
	L_L =	2.27	lb/10^3 gallons of Loading loss

Truck Loading Emissions

Pollutant	Truck load rate	Annual Production	Load Time	Conversion Factor	Emission Rates	
	bbl/hr	*bbl/yr*	*hrs*	*gal/bbl*	*lbs/hr*	*tpy*
VOC (C3+)	200.0	854,392.0	1.00	42	19.09	0.33

HAP Speciated Emissions

HAP	HAP Weight %	Emission Rates
	%	*tpy*
Benzene	0.48	1.55E-03
Toluene	0.09	2.83E-04
Ethylbenzene	0.07	2.31E-04
Xylenes	0.09	2.90E-04
2,2,4-Trimethylpentane	0.00	0.00E+00
n-Hexane	0.93	3.02E-03

(EPA AP-42 Values) Table 1 below is required to supply the saturation factor variable in the above equation.

Cargo Carrier	Mode of Operation	S Factor
Tank Trucks and Rail Tank Cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00

(EPA AP-42 Values) Table 2 below may be used to provide the vapor pressure and molecular weight values for the above equation.

Petroleum Liquid	Vapor MW at 60F Mv(lb/lb-mole)	Condensed Vapor Density at 60F Wvc(lb/gal	Liquid Density at 60F W1(lb/gal)	True Vapor Pressure, Pva (psi) at various temperatures in F						
				40	50	60	70	80	90	100
Crude Oil RVP 5	50	4.5	7.1	1.8	2.3	2.8	3.4	4	4.8	5.7

Sample Calculations- Benzene from Truck Loading Emissions

Benzene Emissions: 0.48 (% Wt Benzene) x 0.33 (TPY VOC) = 1.55E-03 (TPY)

TABLE 11
FUGITIVE EMISSIONS

						VOC EMISSIONS			
Fugitive Components	*Stream Type*	*Number of Components (provided by EOG)*	*EPA Average Total Hydrocarbon Emission Factors [a] (lb/hr/source)*	*Fugitive VOC Emission Rates [a]*		*Total Gas*	*Total Heavy Oil*	*Total Light Oil*	*Total Water/ Light Oil*
				(lbs/hour)	*(tons/year)*	*(tons/year)*	*(tons/year)*	*(tons/year)*	*(tons/year)*
Connectors	Gas	511	4.58E-04	0.09	0.40	0.40			
	Heavy Oil	0	1.67E-05	0.00	0.00		0.00		
	Light Oil	421	4.58E-04	0.19	0.85			0.85	
	Water/Oil	148	2.42E-04	0.04	0.16				0.16
Valves	Gas	120	1.00E-02	0.47	2.06	2.06			
	Heavy Oil	0	1.83E-05	0.00	0.00		0.00		
	Light Oil	122	5.42E-03	0.66	2.89			2.89	
	Water/Oil	69	2.17E-04	0.01	0.07				0.07
Pumps	Gas	0	5.42E-03	0.00	0.00	0.00			
	Light Oil	3	2.88E-02	0.00	0.01	0.01	0.00	0.01	
	Water/Oil	2	5.42E-05	0.00	0.00				0.00
Flanges	Gas	290	8.75E-04	0.10	0.44	0.44			
	Heavy Oil	0	8.75E-07	0.00	0.00		0.00		
	Light Oil	244	2.42E-04	0.06	0.26			0.26	
	Water/Oil	83	6.25E-06	0.00	0.00				0.00
Open Ended Lines	Gas	3	4.58E-03	0.01	0.02	0.02			
	Heavy Oil	0	3.08E-04	0.00	0.00		0.00		
	Light Oil	5	3.08E-03	0.02	0.07			0.07	
	Water/Oil	5	5.42E-04	0.00	0.01				0.01
Others	Gas	0	1.96E-02	0.00	0.00	0.00			
	Heavy Oil	0	7.08E-05	0.00	0.00		0.00		
	Light Oil	0	1.67E-02	0.00	0.00			0.00	
	Water/Oil	0	3.08E-02	0.00	0.00				0.00
Total Fugitive Emission Rates				**1.65**	**7.23**	**2.93**	**0.00**	**4.07**	**0.24**

Speciated HAP Weight Fraction

	Tank Vapor composition[b]				Heavy oil composition[b]				light oil and water/oil composition[b]			
Component	*mol%*	*MW of component*	*MW of W&S Stream*	*wt. fraction*	*mol%*	*MW of component*	*MW of Heavy Oil Stream*	*wt. fraction*	*mol%*	*MW of component*	*MW of LP Oil*	*wt. fraction*
	%	lb/lb-mol	lb/lb-mol		%	lb/lb-mol	lb/lb-mol		%	lb/lb-mol	lb/lb-mol	
Benzene	-	78.11	-	4.37E-06	-	78.11	-	2.90E-04	-	78.11	-	2.90E-04
Toluene	-	92.13	-	5.42E-06	-	92.13	-	1.20E-03	-	92.13	-	1.20E-03
Ethylbenzene	-	106.17	-	2.19E-06	-	106.17	-	1.44E-03	-	106.17	-	1.44E-03
Xylenes	-	106.17	-	5.25E-06	-	106.17	-	3.83E-03	-	106.17	-	3.83E-03
n-hexane	-	86.18	-	2.69E-04	-	86.18	-	1.31E-02	-	86.18	-	1.31E-02
2,2,4-trimethylpentane	-	114.24	-	1.19E-04	-	114.24	-	2.23E-02	-	114.24	-	2.23E-02

TABLE 11

Fugitive HAP Emissions

	Fugitive VOC Emission Rates (tons/yr)	*Speciated Fugitive HAP (weight fraction)* [b]						*Speciated Fugitive Emissions*						
		Benzene	*Toluene*	*Ethyl-Benzene*	*Xylenes*	*n-hexane*	*2,2,4 TMP*	*Benzene (tons/yr)*	*Toluene (tons/yr)*	*Ethyl-Benzene (tons/yr)*	*Xylenes (tons/yr)*	*n-hexane (tons/yr)*	*2,2,4 TMP (tons/yr)*	*Total HAP (tons/yr)*
Gas	2.93	4.37E-06	5.42E-06	2.19E-06	5.25E-06	2.69E-04	1.19E-04	0.0000	0.0000	0.0000	0.0000	0.0008	0.0003	
Heavy Oil	0.00	2.90E-04	1.20E-03	1.44E-03	3.83E-03	1.31E-02	2.23E-02	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Light Oil	4.07	2.90E-04	1.20E-03	1.44E-03	3.83E-03	1.31E-02	2.23E-02	0.0012	0.0049	0.0059	0.0156	0.0534	0.0907	
Water/Light Oil	0.24	2.90E-04	1.20E-03	1.44E-03	3.83E-03	1.31E-02	2.23E-02	0.0001	0.0003	0.0003	0.0009	0.0031	0.0053	
Total	**7.24**							**0.0013**	**0.005**	**0.0062**	**0.0165**	**0.0573**	**0.0964**	**0.1829**

Notes:

[a] EPA Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-4, Pages 2-15.

[b] HAP weight fractionsfor Tank Vapors obtained from Promaxs. HAP weight for Heavy Oil and Light Oil obtained from Liquid Analysi:

Sample Calculations- Fugitive VOC and HAP (Benene) Emissions from Gas

VOC Emissions (connectors)	511 (# of components) x 0.000458 lbs/hr/source x 39.17% NMVOC from Summary -Extended Gas Analysis	=	0.09	lbs/hr	
Benzene Emissions (Gas)	2.93 tons/year AggregateFugitive VOC Emissions from Gas x 0.0000044 Fugitive Emission Factor =			0.0000	tons/year

TABLE 12
GREENHOUSE GAS EMISSIONS

Flare CO_2 and CH_4 Emissions

										No Gas Pipeline[i]			With Gas Pipeline[i]		
Components	Mole fraction of treater gas constituents[a]	Volume of treater gas sent to flare *scf/year*	Mole fraction of tank vapor constituents[b]	Volume of flash gas *scf/year*	Volume of W/B sent to Flare *scf/year*	Component volume of gas sent to Flare *scf/year*	Component volume of gas for destruction *scf/year*	Number of carbon atoms	Flare Efficiency	Flared CO_2 Volume[c] *scf/year*	Unflared CO_2 and CH_4 Volume[c] *scf/year*	Volume GHGs Emitted *scf/year*	Flared CO_2 Volume[c] *scf/year*	Unflared CO_2 and CH_4 Volume[c] *scf/year*	Volume GHGs Emitted *scf/year*
CO_2	0.007	303,862,500	0.000	2,998,910	599,515	43	2,045,949	1	0	--	2,045,949	481,202,674	--	43	127,801
Methane	0.556	303,862,500	0.001	2,998,910	599,515	1,907	168,837,636	1	0.98	165,460,883	3,376,753	3,376,753	1,869	38	38
Ethane	0.152	303,862,500	0.001	2,998,910	599,515	4,452	46,042,355	2	0.98	90,243,016	--		8,725	--	
Propane	0.108	303,862,500	0.003	2,998,910	599,515	10,475	32,678,429	3	0.98	96,074,581	--		30,797	--	
i-Butane	0.013	303,862,500	0.001	2,998,910	599,515	2,125	3,812,865	4	0.98	14,946,430	--		8,331	--	
n-Butane	0.035	303,862,500	0.002	2,998,910	599,515	8,125	10,550,026	4	0.98	41,356,104	--		31,849	--	
Pentane	0.021	303,862,500	0.001	2,998,910	599,515	4,365	6,235,674	5	0.98	30,554,801	--		21,391	--	
Hexane	0.008	303,862,500	0.000	2,998,910	599,515	969	2,578,027	6	0.98	15,158,797	--		5,697	--	
Benzene	0.002	303,862,500	0.000	2,998,910	599,515	16	499,870	6	0.98	2,939,233	--		92	--	
Heptanes	0.009	303,862,500	0.001	2,998,910	599,515	2,024	2,680,876	7	0.98	18,390,810	--		13,887	--	
Toluene	0.000	303,862,500	0.000	2,998,910	599,515	20	76,897	7	0.98	527,512	--		134	--	
Octane plus	0.001	303,862,500	0.000	2,998,910	599,515	609	323,919	8	0.98	2,539,524	--		4,776	--	
Ethyl benzene	0.000	303,862,500	0.000	2,998,910	599,515	8	54,703	8	0.98	428,873	--		62	--	
Xylenes	0.000	303,862,500	0.000	2,998,910	599,515	19	68,388	8	0.98	536,162	--		148	--	
Subtotal										**479,156,725**	--		**127,758**	--	

Flare CO_2 and CH_4 Emissions

	Volume Emitted					Emissions[d]					CO_2e Emissions	
						No Gas Pipeline[i]		With GasPipeline[i]				
Pollutant	No Gas Pipeline[i] *scf/year*	With Gas Pipeline[i] *scf/year*	Density of GHG[d] *lb/scf*	Operating Time *hrs/yr*	Conversion Factor *lb/ton*	*lbs/hr*	*(tons/yr)*	*lbs/hr*	*(tons/yr)*	GWF	No Gas Pipeline[i] *MT/yr*	With Gas Pipeline[i] *MT/yr*
CO_2	481,202,674	127,801	0.12	8760	2000	6370.06	27,900.86	1.69	7.41	1	25,311.10	1.53
CH_4	3,376,753	38	0.09	8760	2000	35.86	157.08	0.00	0.00	25	3,562.45	0.01
Subtotal											28,873.55	1.54

Flare N_2O Emissions

N_2O Source	Volume of gas combusted						Emissions[e]					CO_2e Emissions	
							No Gas Pipeline[i]		With GasPipeline[i]				
	No Gas Pipeline[i] *scf/year*	With Gas Pipeline[i] *scf/year*	HHV *Btu/scf*	Emission Factor *lbs/MMBtu*	Operating Time *hrs/yr*	Conversion Factor *lb/ton*	*lbs/hr*	*tons/yr*	*lbs/hr*	*tons/yr*	GWF	No Gas Pipeline[i] *MT/yr*	With Gas Pipeline[i] *MT/yr*
Flare	303,862,500	0	1,427.7	2.20E-04	8760	2000	1.09E-02	4.78E-02	0.00E+00	0.00E+00	298	12.93	0.00E+00
Subtotal												12.93	0.00E+00

TABLE 12
GREENHOUSE GAS EMISSIONS

Engine, Heater Treater, and Pilot Emissions

Emission Source	Firing Rate *MMBtu/hr*	Operating Time *hrs/yr*	Fuel Type	CO_2 Emissions			CH_4 Emissions			N_2O Emissions			CO_{2e} Emissions	
				Emission Factor[f] *kg/MMBtu*	GWF	Emissions *MT/yr*	Emission Factor[f] *kg/MMBtu*	GWF	Emissions *MT/yr*	Emission Factor[f] *kg/MMBtu*	GWF	Emissions *MT/yr*	No Gas Pipeline[i] *(MT/yr)*	With Gas Pipeline[j] *(MT/yr)*
Engine-1	1.76	8760	Natural Gas	53.02	1	815.74	0.001	25	0.015	0.0001	298	0.0015	816.59	816.59
Engine-2	1.76	8760	Natural Gas	53.02	1	815.75	0.001	21	0.015	0.0001	310	0.0015	816.55	816.55
Heater Treater	1.75	8760	Natural Gas	53.02	1	812.80	0.001	25	0.015	0.0001	298	0.0015	813.64	813.64
Pilot Gas[g]	0.19	8760	Natural Gas	53.02	1	85.94	0.001	25	0.002	0.0001	298	0.0002	86.03	86.03
Subtotal													**2,532.81**	**2,532.81**

GHG Emissions Summary

Emission Sources	CO_2e emissions	
	No Gas Pipeline[i]	With Gas Pipeline[j]
Flare (MT/yr)	28,886.48	1.54
Engine, Treater Heater, Pilot (MT/yr)	2,532.81	2,532.81
Total Emissions (MT/yr)	31,419.28	2,534.35

Notes
a Mole Fraction from laboratory reports for Treater Gas
b Mole fraction from promax for Oil tanks
c 40 CFR 98.233 (n)(4): Eqns: W-19, W-20 and W-21
d 40 CFR 98.233(v) Eqn W-36 - density at 60F and 14.7 psia
e 40 CFR 98.233(z)(6) Eqn W-40
[f] 40 CFR 98.37 Table C-1
[g] MMBtu/hr based on fuel consumption and heating value of treater gas
[i] No Gas Pipeline - gas produced from treater will be sent to engineered flare
[j] With Gas Pipeline - gas produced from treater will be sent to the gas pipeline

Sample Calculations

Methane Volume for Destruction

{303,862,500 (scf/year-Volume of Treater Gas sent to flare) x 0.56 (mole fraction of methane in treater gas)} + { 0.00 (mole fraction of methane in tank vapor) x 2,998,910 scf/year- Volume of flash sent to flare)} + {0.00 (methane mole fraction in tank vapors) x 599,515 scf/year- volume of flash sent to flare)}	168,837,636	scf/year

Methane Combusted Volume

168,837,636 { scf/year- methane volume for destruction} x 1 {# of carbon atoms in methane} x0.98 { default fraction of methane combsted}	165,460,883	scf/year

Methane Uncombusted Volume

168,837,636 scf/year- total volume of gas for destruction x(1-0.98 }default fraction of gas combusted	3,376,753	scf/year
3,376,753 (scf/year- Uncombusted Volume} x 0.093034964{ lbs/scf- methane density }/ 8760 hrs/year - operating time	35.86	lbs/hr
35.86 (lbs/hr) x 8760 (hrs/year) x 25 (global warming potential for methane) x 0.9072 (MT/ton) x / 2000 (lb/ton)	3,562.53	MT/year

Appendix A
EPA Application Forms

EPA Form No. 5900-391
EPA ICR No. 1230.27
OMB Control No. 2060-0003
Approval expires 4/30/2017

United States Environmental Protection Agency
https://www.epa.gov/tribal-air/tribal-minor-new-source-review
January 4, 2017

Part 2: Submit Within 60 Days After Startup of Production -- Emission and Production Information

FEDERAL IMPLEMENTATION PLAN FOR TRUE MINOR SOURCES IN INDIAN COUNTRY IN THE OIL AND NATURAL GAS PRODUCTION AND NATURAL GAS PROCESSING SEGMENTS OF THE OIL AND NATURAL GAS SECTOR

Registration for New True Minor Oil and Natural Gas Sources and Minor Modifications at Existing True Minor Oil and Natural Gas Sources

Please submit information to:

[Reviewing Authority Address Phone]	Federal Minor NSR Permit Coordinator U.S. EPA, Region 8 1595 Wynkoop Street, 8P-AR Denver, CO 80202-1129 R8airpermitting@epa.gov

A. GENERAL SOURCE INFORMATION (See Instructions Below)

1. Company Name EOG Resources, Inc.		**2. Source Name** Fertile 7 SESE 2 PAD	
3. Type of Oil and Natural Gas Operation Oil & Gas Well Site		**4. New Minor Source?** ☒ Yes ☐ No **5. True Source Modification?** ☐ Yes ☒ No	
6. NAICS Code 211120		**7. SIC Code** 1311	
8. U.S. Well ID(s) or API Number(s) [if applicable] 3306103984, 3306103983, 3306103985			
9. Area of Indian Country Fort Berthold Indian Reservation	**10. County** Mountrail	**11a. Latitude** 47.90690	**11b. Longitude** -102.24010

B. CONTACT INFORMATION (See Instructions Below)

1. Owner Name Mathew Oliver	Title Environmental Manager
Mailing Address 600 17th Street, Suite 1000N	
Email Address mathew_oliver@eogresources.com	
Telephone Number 303-262-9915	Facsimile Number
2. Operator Name (if different from owner)	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number
3. Source Contact Mathew Oliver (see above)	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number

4. Compliance Contact	Title
Mathew Oliver	Environmental Manager
Mailing Address	
600 17th Street, Suite 1000N, Denver, CO 80202	
Email Address	
mathew_oliver@eogresources.com	
Telephone Number	Facsimile Number
303-262-9915	

C. EMISSIONS AND OTHER SOURCE INFORMATION

Include all of the following information in the table below and as attachments to this form:

Note: The emission estimates can be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Reviewing Authority. The following procedures are generally acceptable for estimating emissions from air pollution sources: (1) unit-specific emission tests; (2) mass balance calculations; (3) published, verifiable emission factors that are applicable to the unit (i.e., manufacturer specifications); (4) other engineering calculations; or (5) other procedures to estimate emissions specifically approved by the Reviewing Authority. Guidance for estimating emissions can be found at https://www.epa.gov/chief.

- ■ Narrative description of the operations.
- ■ Identification and description of any air pollution control equipment and compliance monitoring devices or activities.
- ■ Type and actual amount (annually) of each fuel that will be used.
- ■ Type of raw materials used (e.g., water for hydraulic fracturing).
- ■ Actual, annual production rates.
- ■ Actual operating schedules.
- ■ Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated New Source Review (NSR) pollutants at your source. Indicate all requirements referenced in the Federal Implementation Plan (FIP) for True Minor Sources in Indian Country in the Oil and Natural Gas Production and Natural Gas Processing Segments of the Oil and Natural Gas Sector that apply to emissions units and air pollution generating activities at the source or proposed. Include statements indicating each emissions unit that is an emissions unit potentially subject to the requirements referenced in the FIP, but does not meet the definition of an affected facility under the referenced requirement, and therefore, is not subject to those requirements.
- ■ For each emissions unit comprising the new source or modification, estimates of the total allowable (potential to emit) annual emissions at startup of production from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides ( ), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Allowable annual emissions are defined as: emissions rate of an emissions unit calculated using the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical

or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation, or the effect it would have on emissions, is legally and practically enforceable. You must determine the potential for emissions within 30 days from the startup of production.

☒ For each emissions unit comprising the new source or modification, estimates of the total actual annual emissions during the upcoming, consecutive 12 months from the air pollution source for the following air pollutants: particulate matter (PM, PM_{10}, $PM_{2.5}$), sulfur oxides (SO_x), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates. Estimates of actual emissions must take into account equipment, operating conditions, and air pollution control measures. You should calculate an estimate of the actual annual emissions using estimated operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted.

D. TABLE OF ESTIMATED EMISSIONS

Provide in the table below estimates of the total allowable annual emissions in tons per year (tpy) and total actual annual emissions (tpy) for the following pollutants for all emissions units comprising the new source or modification.

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
PM		
PM_{10}		
$PM_{2.5}$		
SO_x	0.00	0.00
NO_x	20.34	14.08
CO	61.35	27.28
VOC	95.00	58.45
Pb		

POLLUTANT	TOTAL ALLOWABLE ANNUAL EMISSIONS (TPY)	TOTAL ACTUAL ANNUAL EMISSIONS (TPY)
NH3		
Fluorides		
H_2SO_4		
H_2S	0.00	0.00
TRS		

Instructions for Part 2

Please answer all questions. If the item does not apply to the source and its operations write "n/a". If the answer is not known write "unknown".

A. General Source Information

1. Company Name: Provide the complete company name. For corporations, include divisions or subsidiary name, if any.
2. Source Name: Provide the source name. Please note that a source is a site, place, or location that may contain one or more air pollution emitting units.
3. Type of Operation: Indicate the generally accepted name for the oil and natural gas production or natural gas processing segment operation (e.g., oil and gas well site, tank battery, compressor station, natural gas processing plant).
4. New True Minor Source: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
5. True Minor Source Modification: [Per Federal Indian Country Minor New Source Review Rule, 40 CFR 49.153].
6. North American Industry Classification System (NAICS): The NAICS Code for your oil and natural gas source can be found at the following link for North American Industry Classification System: http://www.census.gov/eos/www/naics/.
7. Standard Industrial Classification Code (SIC Code): Although the new NAICS code has replaced the SIC codes, much of the Clean Air Act permitting processes continue to use these codes. The SIC Code for your oil and natural gas source can be found at the following link for Standard Industrial Classification Codes: http://www.osha.gov/pls/imis/sic_manual.html.
8. U.S. Well ID or API Number: Unique well identifier as assigned by the Federal or State oil and gas regulatory agency with primacy, using the American Petroleum Institute (API) Standard for number format (pre-2014) or the Professional Petroleum Data Management (PPDM) Association US Well Number Standard (2014-present). Provide IDs for all oil and natural gas production wells associated with the facility, if applicable. May not be applicable for downstream production sources, such as compressor stations.
9. Area of Indian Country: Provide the name of the Indian reservation within which the source is operating.
10. County: Provide the County within which the source is operating.
11. Latitude & Longitude (11a. and 11b.): Provide latitude and longitude location(s) in decimal degrees, indicating the datum used in parentheses. These are GPS (global positioning system) coordinates. This information should be provided in decimal degrees with 6 digits to the right of the decimal point, indicating the datum used in parentheses (i.e., NAD 27, NAD 83, WGS 84 – WGS 84 is preferred over NAD 27).

B. Contact Information

Please provide the information requested in full.

1. Owners: List the full name (last, middle initial, first) of all owners of the source.
2. Operator: Provide the name of the operator of the source if it is different from the owner(s).
3. Source Contact: The source contact must be the local contact authorized to receive requests for data and information.
4. Compliance Contact: The compliance contact must be the local contact responsible for the source's compliance with this rule. If this is the same as the Source Contact please note this on the form.

C. Attachments

The information requested in the attachments will enable the U.S. Environmental Protection Agency (EPA) to understand the type of oil and natural gas source being registered and the nature and extent of the air pollutants to be emitted.

Disclaimers:

The public reporting and recordkeeping burden for this collection of information is estimated to average 6 hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Information in these forms submitted in compliance with the final Federal Indian Country Minor NSR rule may be claimed as confidential. A company may assert a claim of confidentiality for information submitted by clearly marking that information as confidential. Such information shall be treated in accordance with EPA's procedures for information claimed as confidential at 40 CFR part 2, subpart B, and will only be disclosed by the means set forth in the subpart. If no claim of confidentiality accompanies the report when it is received by EPA, it may be made public without further notice to the company (40 CFR 2.203).

Appendix B
Gas and Liquid Analysis

zedi

Realize Production Potential

Zedi US
541 E. Garden Dive, Unit O
Windsor, CO 80550
(970) 518-8647

Client:	EOG	**Analysis Date:**	8/28/2018
Well Name:	Fertile 86-0701H	**Date Sampled:**	8/27/2018
Meter #:	0	**Purpose:**	Requested
Sample Temperature:	101.4°F	**Sample Pressure:**	96 PSIG
Sampled By:	Steve White	**Type Sample:**	Spot
Primo #:		**County:**	0
Lab ID:	NDSW18082701-01		

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide.....	0.6733	1.100	0.560
Hydrogen Sulfide.....	0.0000	0.000	0.000
Nitrogen.....	9.3706	9.742	5.022
Methane.....	55.5632	33.082	45.889
Ethane.....	15.1509	16.908	19.739
Propane.....	10.7509	17.594	14.429
iso-Butane.....	1.2541	2.705	1.999
n-Butane.....	3.4693	7.484	5.328
iso-Pentane.....	0.7648	2.048	1.363
n-Pentane.....	1.1145	2.984	1.968
Cyclopentane.....	0.1714	0.446	0.247
n-Hexane.....	0.2895	0.926	0.580
Cyclohexane.....	0.2092	0.653	0.347
Other Hexanes	0.3494	1.117	0.700
Heptanes.....	0.5277	1.962	1.186
Methylcyclohexane.....	0.0045	0.016	0.009
2,2,4-Trimethylpentane...	0.0000	0.000	0.000
Benzene.....	0.1645	0.477	0.224
Toluene.....	0.0253	0.087	0.041
Ethylbenzene.....	0.0180	0.071	0.034
Xylenes.....	0.0225	0.089	0.042
Octanes.....	0.0310	0.131	0.077
Nonanes.....	0.0436	0.208	0.120
Decanes+.....	0.0318	0.168	0.095
Totals	100.000	100.000	100.000

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.1714	0.446	0.247
Cyclohexane	0.2092	0.653	0.347
2-Methylpentane	0.2199	0.703	0.441
3-Methylpentane	0.1295	0.414	0.259
n-Hexane	0.2895	0.926	0.580
Methylcyclohexane	0.0045	0.016	0.009
2,2,4-Trimethylpentane	0.0000	0.000	0.000
Benzene	0.1645	0.477	0.224
Toluene	0.0253	0.087	0.041
Ethylbenzene	0.0180	0.071	0.034
m-Xylene	0.0036	0.014	0.007
p-Xylene	0.0152	0.060	0.029
o-Xylene	0.0037	0.015	0.007

SPECIFIC GRAVITY @ 60/60 F, calculated	0.9303
TOTAL GPM (Ethane Inclusive)	9.891
CALCULATED BTU / REAL CF @ 14.73 PSIA, dry basis	1414.096
CALCULATED BTU / REAL CF @ 14.73 PSIA, wet basis	1390.230
AVERAGE MOLECULAR WEIGHT	26.944
MOLAR MASS RATIO	0.9268
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.9354
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF @ 14.696 PSIA	1418.649
COMPRESSIBILITY FACTOR (Z)	0.99450

PROPANE GPM	2.9543
BUTANE GPM	1.5003
GASOLINE GPM (PENTANE AND HEAVIER)	1.3949

TOTAL ACID GAS MOLE %	0.6733
H2S MOLE %	0.0000
H2S PPM	0

VOC WEIGHT FRACTION	0.388
HIGHER HEATING VALUE (BTU/ft3)	1427.741
LOWER HEATING VALUE (BTU/ft3)	1302.597

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

Zedi US Inc
29 Country Acres RD.
Riverton, WY 82501
307-856-0866

Realize Production Potential

EXTENDED HYDROCARBON LIQUID STUDY
CERTIFICATE OF ANALYSIS

Company:	**EOG RESOURCES**	**Sample Name:**	**FERTILE 85-0701H (PRIMO 98764) PRESSURIZED LIQUID**
Sample Date:	8/27/2018	Lab ID Number:	18083016-04
Sample Facility:	NOT INDICATED	Date Tested:	9/5/2018
Sample Equipment:	TREATER	Test Method:	GPA 2186M
Sample Location:	MOUNTRAIL, ND	Date Reported:	9/5/2018
Sample Pressure:	81 PSIG		
Sample Temperature:	86.1°F		
Sampling Method:	GPA-2174		
Type Sample:	SPOT		

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	0.016	0.004	0.004
Nitrogen	0.248	0.042	0.039
Methane	1.325	0.128	0.319
Ethane	1.843	0.335	0.700
Propane	4.206	1.120	1.645
iso-Butane	1.070	0.376	0.497
n-Butane	5.180	1.818	2.318
iso-Pentane	2.100	0.915	1.090
n-Pentane	3.392	1.478	1.745
2-Methylpentane	1.244	0.647	0.737
3-Methylpentane	1.192	0.620	0.690
Other Hexanes	0.840	0.437	0.498
Heptanes	9.225	5.241	5.508
Octanes	3.041	2.025	2.100
Nonanes	3.230	2.501	2.571
Decanes+	55.001	78.101	75.109
Benzene	0.062	0.029	0.025
Toluene	0.215	0.120	0.102
Ethylbenzene	0.225	0.144	0.123
m-Xylene	0.500	0.321	0.275
p-Xylene	0.081	0.052	0.044
o-Xylene	0.015	0.010	0.008
n-Hexane	2.519	1.311	1.470
2,2,4-Trimethylpentane	3.231	2.228	2.383
Totals	**100.000**	**100.000**	**100.000**

TOTAL C31+ EXTENDED REPORT
CERTIFICATE OF ANALYSIS

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	0.016	0.004	0.004
Nitrogen	0.248	0.042	0.039
Methane	1.325	0.128	0.319
Ethane	1.843	0.335	0.700
Propane	4.206	1.120	1.645
IsoButane	1.070	0.376	0.497
n-Butane	5.180	1.818	2.318
2,2-Dimethylpropane	0.000	0.000	0.000
IsoPentane	2.100	0.915	1.090
n-Pentane	3.392	1.478	1.745
2,2-Dimethylbutane	0.011	0.006	0.007
2-Methylpentane	1.244	0.647	0.737
3-Methylpentane	1.192	0.620	0.690
Other Hexanes	0.829	0.431	0.491
n-Hexane	2.519	1.311	1.470
Methylcyclopentane	2.345	1.191	1.177
Benzene	0.062	0.029	0.025
Cyclohexane	1.166	0.593	0.563
2,2,4-Trimethylpentane	3.231	2.228	2.383
Other Heptanes	2.964	1.793	1.966
n-Heptane	2.750	1.664	1.801
Methylcyclohexane	0.751	0.445	0.429
Toluene	0.215	0.120	0.102
Octanes	0.745	0.514	0.548
n-Octane	1.545	1.066	1.124
Ethylbenzene	0.225	0.144	0.123
m-Xylene	0.500	0.321	0.275
p-Xylene	0.081	0.052	0.044
o-Xylene	0.015	0.010	0.008
Nonanes	2.869	2.222	2.283
n-Nonane	0.361	0.279	0.288
Decanes	0.446	0.448	0.447
n-Decane	0.131	0.113	0.115
Undecanes (C11)	6.115	5.771	5.805
Dodecanes (C12)	5.969	6.139	6.092
Tridecanes (C13)	4.927	5.485	5.400
Tetradecanes (C14)	5.912	7.081	6.908
Pentadecanes (C15)	4.852	6.222	6.023
Hexadecanes (C16)	4.387	5.998	5.776
Heptadecanes (C17)	3.182	4.620	4.426
Octadecanes (C18)	2.784	4.278	4.099
Nonadecanes (C19)	2.402	3.895	3.689
Eicosanes (C20)	2.837	4.840	4.568
Heneicoanes (C21)	1.821	3.260	3.064
Docosanes (C22)	1.494	2.802	2.681
Tricosanes (C23)	1.389	2.722	2.542
Tetracosanes (C24)	1.247	2.550	2.382
Pentacosanes (C25)	1.286	2.739	2.545
Hexacosanes (C26)	0.952	2.108	2.017
Heptacosanes (C27)	0.787	1.810	1.727
Octaconsanes (C28)	0.588	1.401	1.293
Nonacosanes (C29)	0.438	1.082	0.997
Triacontanes (C30)	0.423	1.081	0.993
Hentriacontanes Plus (C31+)	0.628	1.656	1.521
Totals	**100.000**	**100.000**	**100.000**

CALCULATED SAMPLE CHARACTERISTICS

RELATIVE SPECIFIC GRAVITY	**0.74579**
API GRAVITY AT 60/60 F	**58.2**
TRUE VAPOR PRESSURE AT 100 F, PSIA	**106.736**
AVERAGE MOLECULAR WEIGHT	**165.633**
AVERAGE BOILING POINT, F	**351.638**
RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION	**0.77588**
AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION	**235.762**
BTU / GALLON OF LIQUID AT 14.73 PSIA	**68,310.55**
LBS / GALLON OF LIQUID	**6.218**
CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated	**20.330**

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-16, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

Zedi US Inc
29 Country Acres Road
Riverton, WY 82501
307-856-0866

Realize Production Potential

CONDENSATE LIQUID STUDIES
CERTIFICATE OF ANALYSIS

Company:	**EOG Resources**	Sample Name:	**FERTILE 85-0701H PRIMO 98764**
Date Sampled:	8/27/2018	Sample Number:	18083016-03
Sample Location:	North Dakota	Date Reported:	9/7/2018
Type of Sample	SPOT	Sampling Method:	ASTM D4057
County:	Not Indicated		

TEST PERFORMED	RESULTS	DATE TESTED
API GRAVITY AT 60/60 F, (ASTM D-7777), calculated from SG	42.5	9/4/2018
SPECIFIC GRAVITY AT 60/60 F, (ASTM D-7777), measured	0.8134	9/4/2018
REID VAPOR PRESSURE (ASTM D5191), PSI AT 100 F, measured	6.08	9/4/2018
CLOUD POINT (ASTM D-97), deg F, measured	-13.0	9/7/2018
POUR POINT (ASTM D-97), deg F, measured	-63.4	9/7/2018
PARAFFIN CONTENT (UOP-46), weight %, measured	5.941	9/5/2018
EOG GRINDOUT (EOG METHOD), volume %, measured	6.750	9/7/2018
KINEMATIC VISCOSITY AT 100 F (ASTM D-445), measured, SUS	32.800	9/4/2018
KINEMATIC VISCOSITY AT 120 F (ASTM D-445), measured, SUS	<32.0	9/4/2018
ASPHALTENES (ASTM D-3279), weight %, measured	0.016	9/6/2018

ASTM D86 Distillation
Certificate of Analysis

Date Tested:	9/6/2018	Qualifiers:
	% Recovery	DEG C
	Initial Boiling Point	27
	5	43
	10	70
	20	109
	30	146
	40	183
	50	211
	60	253
	70	268
	80	279
	85	288
	90	297
	92	300
	Final Boiling Point	300
	Volume % Recovery	92
	Volume % Residue	0
	Volume % Loss	8

Comments: Residue and loss observed
Temperatures are uncorrected for barometric pressure

Appendix C
Modeling

Bryan Research & Engineering, Inc.

ProMax® 4.0

Simulation Report

Project: Fertile 7 SESE PAD Pt. 2.pmx

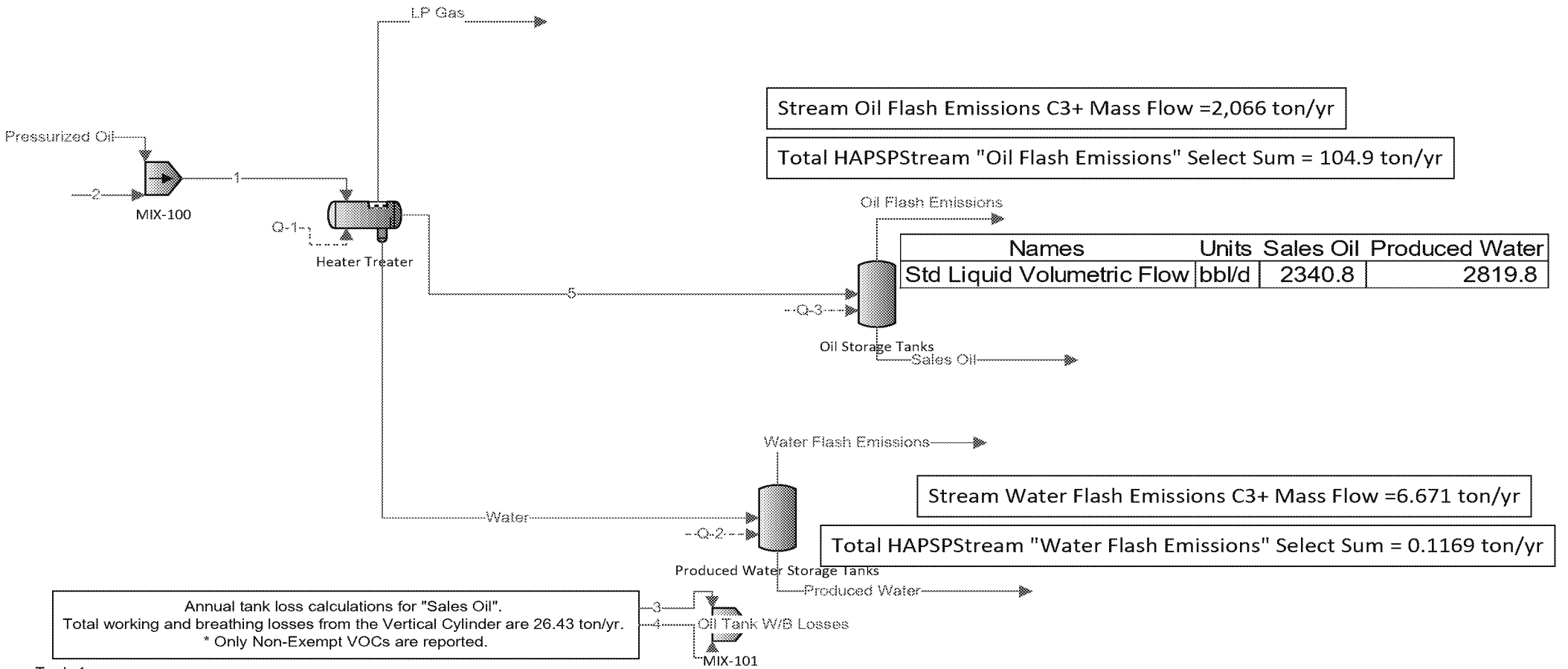
Licensed to EOG Resources, Inc. and Affiliates

Client Name: EOG
Location: Fertile 7 SESE 2 PAD
Job:

ProMax Filename: C:\Users\msmith6\Documents\ProMax\EOG Promax\Fertile 7 SESE PAD Pt. 2.pmx
ProMax Version: 4.0.18221.0
Simulation Initiated: 9/28/2018 1:32:09 PM

Bryan Research & Engineering, LLC
Chemical Engineering Consultants
P.O. Box 4747 Bryan, Texas 77805
Office: (979) 776-5220
FAX: (979) 776-4818
mailto:sales@bre.com
http://www.bre.com/

Report Navigator can be activated via the ProMax Navigator Toolbar.
An asterisk (*), throughout the report, denotes a user specified value.
A question mark (?) after a value, throughout the report, denotes an extrapolated or approximate value.


LP Gas
Pressurized Oil
2
MIX-100
1
Q-1
Heater Treater
5
Stream Oil Flash Emissions C3+ Mass Flow =2,066 ton/yr
Total HAPSPStream "Oil Flash Emissions" Select Sum = 104.9 ton/yr
Oil Flash Emissions
Names | Units | Sales Oil | Produced Water
Std Liquid Volumetric Flow | bbl/d | 2340.8 | 2819.8
Q-3
Oil Storage Tanks
Sales Oil
Water Flash Emissions
Water
Q-2
Produced Water Storage Tanks
Stream Water Flash Emissions C3+ Mass Flow =6.671 ton/yr
Total HAPSPStream "Water Flash Emissions" Select Sum = 0.1169 ton/yr
Produced Water
Annual tank loss calculations for "Sales Oil".
Total working and breathing losses from the Vertical Cylinder are 26.43 ton/yr.
* Only Non-Exempt VOCs are reported.
3
4
Oil Tank W/B Losses
MIX-101
Tank-1
Annual tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.001096 ton/yr.
* Only Non-Exempt VOCs are reported.
6
7
Water Tank W/B Losses
MIX-102
Tank-2

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Composition	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	**From Block:**	**Oil Storage Tanks**	**MIX-101**	**Oil Storage Tanks**	**Produced Water Storage Tanks**	**MIX-102**
	To Block:	--	--	--	--	--
Mole Fraction		%	%	%	%	%
Hydrogen Sulfide		0	0	0	0	0
Oxygen		0	0	0	0	0
Carbon Dioxide		0.120580	0.139968	0.00115980	0.852965	0.910456
Nitrogen		2.75563	0.346864	0.00393396	12.3672	0.255455
Methane		14.5938	6.46167	0.0541790	49.0898	2.81240
Ethane		18.1720	28.6381	0.354775	17.6764	0.942068
Propane		29.1597	33.7782	1.96776	8.87973	0.0701808
Isobutane		4.48805	4.58656	0.764751	0.584276	0.00100876
n-Butane		17.1587	16.6012	4.10891	2.93673	0.00504369
Isopentane		3.26759	2.85432	1.99602	0.317935	0.000126394
n-Pentane		4.15945	3.45211	3.32426	0.202983	2.75423E-05
2-Methylpentane		0.701957	0.519196	1.29259	0.0396915	2.62848E-06
3-Methylpentane		0.611479	0.446219	1.24393	0.0754582	1.06364E-05
Heptane		1.35021	0.759916	9.92926	0.0275523	1.23588E-07
Octane		0.138448	0.0710159	3.30049	0.00133984	7.72141E-10
Nonane		0.0484826	0.0212407	3.51441	0.000354704	4.57571E-11
Benzene		0.0247155	0.0109032	0.0646766	0.0225563	0.000189843
Toluene		0.0260048	0.0107396	0.231372	0.0232241	4.10360E-05
Ethylbenzene		0.00911028	0.00362094	0.244147	0.00795176	3.75028E-06
m-Xylene		0.0182973	0.00964226	0.542844	0.0157608	6.24117E-06
p-Xylene		0.00307247	0.00116859	0.0879268	0.00265403	8.52649E-07
o-Xylene		0.000490694	0.000156820	0.0162846	0.000442016	2.03834E-07
n-Hexane		1.38010	0.989776	3.53622	0.0416531	9.94391E-07
2,2,4-Trimethylpentane		0.461221	0.296502	3.47870	0.0104684	6.24506E-08
Water		1.35071	0.000833690	0.0239442	6.82280	95.0030
C10+		0.000249365	2.85814E-05	59.9175	4.90855E-06	1.28459E-16
Molar Flow		lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Hydrogen Sulfide		0	0	0	0	0
Oxygen		0	0	0	0	0
Carbon Dioxide		0.0161117	0.000243520	0.00173923	0.00197360	6.55091E-05
Nitrogen		0.368203	0.000603484	0.00589934	0.0286155	1.83805E-05
Methane		1.95001	0.0112422	0.0812465	0.113585	0.000202358
Ethane		2.42812	0.0498254	0.532019	0.0409000	6.77836E-05
Propane		3.89629	0.0587683	2.95084	0.0205461	5.04964E-06
Isobutane		0.599688	0.00797983	1.14682	0.00135191	7.25826E-08
n-Butane		2.29272	0.0288833	6.16170	0.00679506	3.62903E-07
Isopentane		0.436611	0.00496602	2.99323	0.000735643	9.09428E-09
n-Pentane		0.555780	0.00600609	4.98504	0.000469666	1.98172E-09
2-Methylpentane		0.0937946	0.000903312	1.93836	9.18387E-05	1.89124E-10
3-Methylpentane		0.0817051	0.000776345	1.86540	0.000174596	7.65309E-10
Heptane		0.180413	0.00132212	14.8899	6.37510E-05	8.89241E-12
Octane		0.0184992	0.000123556	4.94940	3.10015E-06	5.55571E-14
Nonane		0.00647819	3.69551E-05	5.27018	8.20720E-07	3.29231E-15
Benzene		0.00330246	1.89696E-05	0.0969887	5.21912E-05	1.36595E-08
Toluene		0.00347473	1.86851E-05	0.346965	5.37362E-05	2.95262E-09
Ethylbenzene		0.00121730	6.29981E-06	0.366122	1.83989E-05	2.69840E-10
m-Xylene		0.00244487	1.67759E-05	0.814045	3.64676E-05	4.49064E-10
p-Xylene		0.000410540	2.03314E-06	0.131855	6.14094E-06	6.13497E-11
o-Xylene		6.55659E-05	2.72841E-07	0.0244203	1.02274E-06	1.46662E-11
n-Hexane		0.184408	0.00172204	5.30289	9.63776E-05	7.15484E-11
2,2,4-Trimethylpentane		0.0616278	0.000515863	5.21664	2.42220E-05	4.49344E-12
Water		0.180481	1.45048E-06	0.0359066	0.0157867	0.00683565
C10+		3.33199E-05	4.97267E-08	89.8519	1.13575E-08	9.24288E-21
Mass Fraction		%	%	%	%	%
Hydrogen Sulfide		0	0	0	0	0
Oxygen		0	0	0	0	0
Carbon Dioxide		0.120142	0.138445	0.000287455	1.51113	2.18280
Nitrogen		1.74767	0.218387	0.000620633	13.9464	0.389843
Methane		5.30046	2.32980	0.00489487	31.7020	2.45786
Ethane		12.3707	19.3538	0.0600775	21.3962	1.54316
Propane		29.1107	33.4761	0.488660	15.7623	0.168587
Isobutane		5.90572	5.99144	0.250323	1.36705	0.00319404
n-Butane		22.5787	21.6862	1.34496	6.87116	0.0159698
Isopentane		5.33740	4.62842	0.811025	0.923402	0.000496780
n-Pentane		6.79419	5.59779	1.35071	0.589539	0.000108252
2-Methylpentane		1.36952	1.00558	0.627311	0.137690	1.23395E-05
3-Methylpentane		1.19299	0.864238	0.603698	0.261766	4.99329E-05
Heptane		3.06302	1.71137	5.60315	0.111137	6.74624E-07
Octane		0.358042	0.182319	2.12321	0.00616101	4.80486E-09
Nonane		0.140778	0.0612273	2.53843	0.00183132	3.19700E-10
Benzene		0.0437079	0.0191413	0.0284514	0.0709266	0.000807830
Toluene		0.0542460	0.0222399	0.120058	0.0861396	0.000205975
Ethylbenzene		0.0218971	0.00863981	0.145973	0.0339835	2.16898E-05
m-Xylene		0.0439787	0.0230071	0.324560	0.0673572	3.60958E-05
p-Xylene		0.00738486	0.00278833	0.0525705	0.0113426	4.93129E-06
o-Xylene		0.00117941	0.000374185	0.00973640	0.00188905	1.17887E-06
n-Hexane		2.69258	1.91700	1.71618	0.144495	4.66820E-06
2,2,4-Trimethylpentane		1.19277	0.761210	2.23785	0.0481370	3.88616E-07
Water		0.550906	0.000337558	0.00242930	4.94797	93.2368
C10+		0.00133102	0.000151446	79.5548	4.65854E-05	1.64986E-15

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
Hydrogen Sulfide	0	0	0	0	0
Oxygen	0	0	0	0	0
Carbon Dioxide	0.709068	0.0107172	0.0765427	0.0868573	0.00288302
Nitrogen	10.3146	0.0169056	0.165261	0.801617	0.000514901
Methane	31.2829	0.180353	1.30339	1.82218	0.00324631
Ethane	73.0111	1.49820	15.9973	1.22982	0.00203819
Propane	171.809	2.59143	130.119	0.905991	0.000222667
Isobutane	34.8552	0.463805	66.6555	0.0785757	4.21866E-06
n-Butane	133.258	1.67876	358.132	0.394944	2.10927E-05
Isopentane	31.5009	0.358292	215.958	0.0530757	6.56141E-07
n-Pentane	40.0989	0.433332	359.664	0.0338858	1.42979E-07
2-Methylpentane	8.08279	0.0778432	167.039	0.00791423	1.62978E-08
3-Methylpentane	7.04097	0.0669018	160.751	0.0150459	6.59508E-08
Heptane	18.0777	0.132479	1491.99	0.00638797	8.91036E-10
Octane	2.11314	0.0141136	565.363	0.000354125	6.34620E-12
Nonane	0.830861	0.00473968	675.928	0.000105262	4.22256E-13
Benzene	0.257961	0.00148175	7.57596	0.00407675	1.06697E-06
Toluene	0.320156	0.00172162	31.9688	0.00495117	2.72050E-07
Ethylbenzene	0.129235	0.000668819	38.8693	0.00195332	2.86476E-08
m-Xylene	0.259559	0.00178101	86.4231	0.00387159	4.76749E-08
p-Xylene	0.0435849	0.000215848	13.9983	0.000651953	6.51319E-09
o-Xylene	0.00696081	2.89661E-05	2.59258	0.000108579	1.55704E-09
n-Hexane	15.8914	0.148398	456.979	0.00830537	6.16571E-09
2,2,4-Trimethylpentane	7.03965	0.0589263	595.889	0.00276684	5.13279E-10
Water	3.25141	2.61308E-05	0.646868	0.284402	0.123146
C10+	0.00785556	1.17237E-05	21183.7	2.67766E-06	2.17912E-18

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Properties	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	Oil Storage Tanks	MIX-101	Oil Storage Tanks	Produced Water Storage Tanks	MIX-102
	To Block:	--	--	--	--	--
Property	Units					
Temperature	°F	95*	64.4643	95	95*	64.4643
Pressure	psia	12*	12.1858	12	12*	0.316079
Mole Fraction Vapor	%	100	100	0	100	100
Mole Fraction Light Liquid	%	0	0	100	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	44.1699	44.4936	177.566	24.8414	18.3565
Mass Density	lb/ft^3	0.0901045	0.0978320	47.8586	0.0502366	0.00103186
Molar Flow	lbmol/h	13.3619	0.173983	149.959	0.231382	0.00719520
Mass Flow	lb/h	590.193	7.74113	26627.7	5.74785	0.132079
Vapor Volumetric Flow	ft^3/h	6550.10	79.1268	556.384	114.416	128.001
Liquid Volumetric Flow	gpm	816.636	9.86516	69.3673	14.2648	15.9586
Std Vapor Volumetric Flow	MMSCFD	0.121695	0.00158457	1.36577	0.00210733	6.55311E-05
Std Liquid Volumetric Flow	sgpm	2.31359	0.0313057	68.2733	0.0274515	0.000288556
Compressibility		0.988242	0.985290	0.00747969	0.996872	0.999678
Specific Gravity		1.52507	1.53625	0.767346	0.857710	0.633804
API Gravity				49.4026		
Enthalpy	Btu/h	-614778	-8043.14	-2.23019E+07	-8533.37	-731.691
Mass Enthalpy	Btu/lb	-1041.66	-1039.01	-837.543	-1484.62	-5539.80
Mass Cp	Btu/(lb*°F)	0.418012	0.400816	0.495195	0.431259	0.443410
Ideal Gas CpCv Ratio		1.12124	1.12626	1.02924	1.22836	1.32283
Dynamic Viscosity	cP	0.00879704	0.00816504	1.32750	0.0114269	0.00998657
Kinematic Viscosity	cSt	6.09494	5.21023	1.73162	14.1999	604.192
Thermal Conductivity	Btu/(h*ft*°F)	0.0117377	0.0102347	0.0695674	0.0161696	0.0118813
Surface Tension	lbf/ft			0.00171320		
Net Ideal Gas Heating Value	Btu/ft^3	2256.87	2324.25	8815.08	1075.54	42.6503
Net Liquid Heating Value	Btu/lb	19238.7	19669.9	18687.0	16301.7	-110.655
Gross Ideal Gas Heating Value	Btu/ft^3	2453.15	2525.93	9425.76	1184.14	94.8525
Gross Liquid Heating Value	Btu/lb	20925.5	21390.7	19992.1	17961.3	968.553

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Composition	Status:	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	From Block:	Oil Storage Tanks	MIX-101	Oil Storage Tanks	Produced Water Storage Tanks	MIX-102
	To Block:	--	--	--	--	--
Mole Fraction		%	%	%	%	%
Hydrogen Sulfide		0	0		0	0
Oxygen		0	0		0	0
Carbon Dioxide		0.120580	0.139968		0.852965	0.910456
Nitrogen		2.75563	0.346864		12.3672	0.255455
Methane		14.5938	6.46167		49.0898	2.81240
Ethane		18.1720	28.6381		17.6764	0.942068
Propane		29.1597	33.7782		8.87973	0.0701808
Isobutane		4.48805	4.58656		0.584276	0.00100876
n-Butane		17.1587	16.6012		2.93673	0.00504369
Isopentane		3.26759	2.85432		0.317935	0.000126394
n-Pentane		4.15945	3.45211		0.202983	2.75423E-05
2-Methylpentane		0.701957	0.519196		0.0396915	2.62848E-06
3-Methylpentane		0.611479	0.446219		0.0754582	1.06364E-05
Heptane		1.35021	0.759916		0.0275523	1.23588E-07
Octane		0.138448	0.0710159		0.00133984	7.72141E-10
Nonane		0.0484826	0.0212407		0.000354704	4.57571E-11
Benzene		0.0247155	0.0109032		0.0225563	0.000189843
Toluene		0.0260048	0.0107396		0.0232241	4.10360E-05
Ethylbenzene		0.00911028	0.00362094		0.00795176	3.75028E-06
m-Xylene		0.0182973	0.00964226		0.0157608	6.24117E-06
p-Xylene		0.00307247	0.00116859		0.00265403	8.52649E-07
o-Xylene		0.000490694	0.000156820		0.000442016	2.03834E-07
n-Hexane		1.38010	0.989776		0.0416531	9.94391E-07
2,2,4-Trimethylpentane		0.461221	0.296502		0.0104684	6.24506E-08
Water		1.35071	0.000833690		6.82280	95.0030
C10+		0.000249365	2.85814E-05		4.90855E-06	0

Molar Flow	lbmol/h	lbmol/h	lbmol/h	lbmol/h	lbmol/h
Hydrogen Sulfide	0	0		0	0
Oxygen	0	0		0	0
Carbon Dioxide	0.0161117	0.000243520		0.00197360	6.55091E-05
Nitrogen	0.368203	0.000603484		0.0286155	1.83805E-05
Methane	1.95001	0.0112422		0.113585	0.000202358
Ethane	2.42812	0.0498254		0.0409000	6.77836E-05
Propane	3.89629	0.0587683		0.0205461	5.04964E-06
Isobutane	0.599688	0.00797983		0.00135191	7.25826E-08
n-Butane	2.29272	0.0288833		0.00679506	3.62903E-07
Isopentane	0.436611	0.00496602		0.000735643	9.09428E-09
n-Pentane	0.555780	0.00600609		0.000469666	1.98172E-09
2-Methylpentane	0.0937946	0.000903312		9.18387E-05	1.89124E-10
3-Methylpentane	0.0817051	0.000776345		0.000174596	7.65309E-10
Heptane	0.180413	0.00132212		6.37510E-05	8.89241E-12
Octane	0.0184992	0.000123556		3.10015E-06	5.55571E-14
Nonane	0.00647819	3.69551E-05		8.20720E-07	3.29231E-15
Benzene	0.00330246	1.89696E-05		5.21912E-05	1.36595E-08
Toluene	0.00347473	1.86851E-05		5.37362E-05	2.95262E-09
Ethylbenzene	0.00121730	6.29981E-06		1.83989E-05	2.69840E-10
m-Xylene	0.00244487	1.67759E-05		3.64676E-05	4.49064E-10
p-Xylene	0.000410540	2.03314E-06		6.14094E-06	6.13497E-11
o-Xylene	6.55659E-05	2.72841E-07		1.02274E-06	1.46662E-11
n-Hexane	0.184408	0.00172204		9.63776E-05	7.15484E-11
2,2,4-Trimethylpentane	0.0616278	0.000515863		2.42220E-05	4.49344E-12
Water	0.180481	1.45048E-06		0.0157867	0.00683565
C10+	3.33199E-05	4.97267E-08		1.13575E-08	0
Mass Fraction	%	%	%	%	%
Hydrogen Sulfide	0	0		0	0
Oxygen	0	0		0	0
Carbon Dioxide	0.120142	0.138445		1.51113	2.18280
Nitrogen	1.74767	0.218387		13.9464	0.389843
Methane	5.30046	2.32980		31.7020	2.45786
Ethane	12.3707	19.3538		21.3962	1.54316
Propane	29.1107	33.4761		15.7623	0.168587
Isobutane	5.90572	5.99144		1.36705	0.00319404
n-Butane	22.5787	21.6862		6.87116	0.0159698
Isopentane	5.33740	4.62842		0.923402	0.000496780
n-Pentane	6.79419	5.59779		0.589539	0.000108252
2-Methylpentane	1.36952	1.00558		0.137690	1.23395E-05
3-Methylpentane	1.19299	0.864238		0.261766	4.99329E-05
Heptane	3.06302	1.71137		0.111137	6.74624E-07
Octane	0.358042	0.182319		0.00616101	4.80486E-09
Nonane	0.140778	0.0612273		0.00183132	3.19700E-10
Benzene	0.0437079	0.0191413		0.0709266	0.000807830
Toluene	0.0542460	0.0222399		0.0861396	0.000205975
Ethylbenzene	0.0218971	0.00863981		0.0339835	2.16898E-05
m-Xylene	0.0439787	0.0230071		0.0673572	3.60958E-05
p-Xylene	0.00738486	0.00278833		0.0113426	4.93129E-06
o-Xylene	0.00117941	0.000374185		0.00188905	1.17887E-06
n-Hexane	2.69258	1.91700		0.144495	4.66820E-06
2,2,4-Trimethylpentane	1.19277	0.761210		0.0481370	3.88616E-07
Water	0.550906	0.000337558		4.94797	93.2368
C10+	0.00133102	0.000151446		4.65854E-05	0
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h
Hydrogen Sulfide	0	0		0	0
Oxygen	0	0		0	0
Carbon Dioxide	0.709068	0.0107172		0.0868573	0.00288302
Nitrogen	10.3146	0.0169056		0.801617	0.000514901
Methane	31.2829	0.180353		1.82218	0.00324631
Ethane	73.0111	1.49820		1.22982	0.00203819
Propane	171.809	2.59143		0.905991	0.000222667
Isobutane	34.8552	0.463805		0.0785757	4.21866E-06
n-Butane	133.258	1.67876		0.394944	2.10927E-05
Isopentane	31.5009	0.358292		0.0530757	6.56141E-07
n-Pentane	40.0989	0.433332		0.0338858	1.42979E-07
2-Methylpentane	8.08279	0.0778432		0.00791423	1.62978E-08
3-Methylpentane	7.04097	0.0669018		0.0150459	6.59508E-08
Heptane	18.0777	0.132479		0.00638797	8.91036E-10
Octane	2.11314	0.0141136		0.000354125	6.34620E-12
Nonane	0.830861	0.00473968		0.000105262	4.22256E-13
Benzene	0.257961	0.00148175		0.00407675	1.06697E-06
Toluene	0.320156	0.00172162		0.00495117	2.72050E-07
Ethylbenzene	0.129235	0.000668819		0.00195332	2.86476E-08
m-Xylene	0.259559	0.00178101		0.00387159	4.76749E-08
p-Xylene	0.0435849	0.000215848		0.000651953	6.51319E-09
o-Xylene	0.00696081	2.89661E-05		0.000108579	1.55704E-09
n-Hexane	15.8914	0.148398		0.00830537	6.16571E-09
2,2,4-Trimethylpentane	7.03965	0.0589263		0.00276684	5.13279E-10
Water	3.25141	2.61308E-05		0.284402	0.123146
C10+	0.00785556	1.17237E-05		2.67766E-06	0

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: **Vapor**	**From Block:**	**Oil Storage Tanks**	**MIX-101**	**Oil Storage Tanks**	**Produced Water Storage Tanks**	**MIX-102**
	To Block:	--	--	--	--	--
Property	**Units**					
Temperature	°F	95	64.4643		95	64.4643
Pressure	psia	12	12.1858		12	0.316079
Mole Fraction Vapor	%	100	100		100	100
Mole Fraction Light Liquid	%	0	0		0	0
Mole Fraction Heavy Liquid	%	0	0		0	0
Molecular Weight	lb/lbmol	44.1699	44.4936		24.8414	18.3565
Mass Density	lb/ft^3	0.0901045	0.0978320		0.0502366	0.00103186
Molar Flow	lbmol/h	13.3619	0.173983		0.231382	0.00719520
Mass Flow	lb/h	590.193	7.74113		5.74785	0.132079
Vapor Volumetric Flow	ft^3/h	6550.10	79.1268		114.416	128.001
Liquid Volumetric Flow	gpm	816.636	9.86516		14.2648	15.9586
Std Vapor Volumetric Flow	MMSCFD	0.121695	0.00158457		0.00210733	6.55311E-05
Std Liquid Volumetric Flow	sgpm	2.31359	0.0313057		0.0274515	0.000288556
Compressibility		0.988242	0.985290		0.996872	0.999678
Specific Gravity		1.52507	1.53625		0.857710	0.633804
API Gravity						
Enthalpy	Btu/h	-614778	-8043.14		-8533.37	-731.691
Mass Enthalpy	Btu/lb	-1041.66	-1039.01		-1484.62	-5539.80
Mass Cp	Btu/(lb*°F)	0.418012	0.400816		0.431259	0.443410
Ideal Gas CpCv Ratio		1.12124	1.12626		1.22836	1.32283
Dynamic Viscosity	cP	0.00879704	0.00816504		0.0114269	0.00998657
Kinematic Viscosity	cSt	6.09494	5.21023		14.1999	604.192
Thermal Conductivity	Btu/(h*ft*°F)	0.0117377	0.0102347		0.0161696	0.0118813
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	2256.87	2324.25		1075.54	42.6503
Net Liquid Heating Value	Btu/lb	19238.7	19669.9		16301.7	-110.655
Gross Ideal Gas Heating Value	Btu/ft^3	2453.15	2525.93		1184.14	94.8525
Gross Liquid Heating Value	Btu/lb	20925.5	21390.7		17961.3	968.553

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Composition	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: **Light Liquid**	**From Block:**	**Oil Storage Tanks**	**MIX-101**	**Oil Storage Tanks**	**Produced Water Storage Tanks**	**MIX-102**
	To Block:	--	--	--	--	--
Mole Fraction		%	%	%	%	%
Hydrogen Sulfide				0		
Oxygen				0		
Carbon Dioxide				0.00115980		
Nitrogen				0.00393396		
Methane				0.0541790		
Ethane				0.354775		
Propane				1.96776		
Isobutane				0.764751		
n-Butane				4.10891		
Isopentane				1.99602		
n-Pentane				3.32426		
2-Methylpentane				1.29259		
3-Methylpentane				1.24393		
Heptane				9.92926		
Octane				3.30049		
Nonane				3.51441		
Benzene				0.0646766		
Toluene				0.231372		
Ethylbenzene				0.244147		
m-Xylene				0.542844		
p-Xylene				0.0879268		
o-Xylene				0.0162846		
n-Hexane				3.53622		
2,2,4-Trimethylpentane				3.47870		
Water				0.0239442		
C10+				59.9175		
Molar Flow		**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**	**lbmol/h**
Hydrogen Sulfide				0		
Oxygen				0		
Carbon Dioxide				0.00173923		
Nitrogen				0.00589934		
Methane				0.0812465		
Ethane				0.532019		
Propane				2.95084		
Isobutane				1.14682		
n-Butane				6.16170		
Isopentane				2.99323		
n-Pentane				4.98504		
2-Methylpentane				1.93836		
3-Methylpentane				1.86540		
Heptane				14.8899		
Octane				4.94940		
Nonane				5.27018		
Benzene				0.0969887		
Toluene				0.346965		
Ethylbenzene				0.366122		
m-Xylene				0.814045		
p-Xylene				0.131855		
o-Xylene				0.0244203		
n-Hexane				5.30289		
2,2,4-Trimethylpentane				5.21664		
Water				0.0359066		
C10+				89.8519		

Mass Fraction	%	%	%	%	%
Hydrogen Sulfide			0		
Oxygen			0		
Carbon Dioxide			0.000287455		
Nitrogen			0.000620633		
Methane			0.00489487		
Ethane			0.0600775		
Propane			0.488660		
Isobutane			0.250323		
n-Butane			1.34496		
Isopentane			0.811025		
n-Pentane			1.35071		
2-Methylpentane			0.627311		
3-Methylpentane			0.603698		
Heptane			5.60315		
Octane			2.12321		
Nonane			2.53843		
Benzene			0.0284514		
Toluene			0.120058		
Ethylbenzene			0.145973		
m-Xylene			0.324560		
p-Xylene			0.0525705		
o-Xylene			0.00973640		
n-Hexane			1.71618		
2,2,4-Trimethylpentane			2.23785		
Water			0.00242930		
C10+			79.5548		
Mass Flow	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**
Hydrogen Sulfide			0		
Oxygen			0		
Carbon Dioxide			0.0765427		
Nitrogen			0.165261		
Methane			1.30339		
Ethane			15.9973		
Propane			130.119		
Isobutane			66.6555		
n-Butane			358.132		
Isopentane			215.958		
n-Pentane			359.664		
2-Methylpentane			167.039		
3-Methylpentane			160.751		
Heptane			1491.99		
Octane			565.363		
Nonane			675.928		
Benzene			7.57596		
Toluene			31.9688		
Ethylbenzene			38.8693		
m-Xylene			86.4231		
p-Xylene			13.9983		
o-Xylene			2.59258		
n-Hexane			456.979		
2,2,4-Trimethylpentane			595.889		
Water			0.646868		
C10+			21183.7		

Process Streams		Oil Flash Emissions	Oil Tank W/B Losses	Sales Oil	Water Flash Emissions	Water Tank W/B Losses
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: **Light Liquid**	**From Block:**	**Oil Storage Tanks**	**MIX-101**	**Oil Storage Tanks**	**Produced Water Storage Tanks**	**MIX-102**
	To Block:	--	--	--	--	--
Property	**Units**					
Temperature	°F			95		
Pressure	psia			12		
Mole Fraction Vapor	%			0		
Mole Fraction Light Liquid	%			100		
Mole Fraction Heavy Liquid	%			0		
Molecular Weight	lb/lbmol			177.566		
Mass Density	lb/ft^3			47.8586		
Molar Flow	lbmol/h			149.959		
Mass Flow	lb/h			26627.7		
Vapor Volumetric Flow	ft^3/h			556.384		
Liquid Volumetric Flow	gpm			69.3673		
Std Vapor Volumetric Flow	MMSCFD			1.36577		
Std Liquid Volumetric Flow	sgpm			68.2733		
Compressibility				0.00747969		
Specific Gravity				0.767346		
API Gravity				49.4026		
Enthalpy	Btu/h			-2.23019E+07		
Mass Enthalpy	Btu/lb			-837.543		
Mass Cp	Btu/(lb*°F)			0.495195		
Ideal Gas CpCv Ratio				1.02924		
Dynamic Viscosity	cP			1.32750		
Kinematic Viscosity	cSt			1.73162		
Thermal Conductivity	Btu/(h*ft*°F)			0.0695674		
Surface Tension	lbf/ft			0.00171320		
Net Ideal Gas Heating Value	Btu/ft^3			8815.08		
Net Liquid Heating Value	Btu/lb			18687.0		
Gross Ideal Gas Heating Value	Btu/ft^3			9425.76		
Gross Liquid Heating Value	Btu/lb			19992.1		